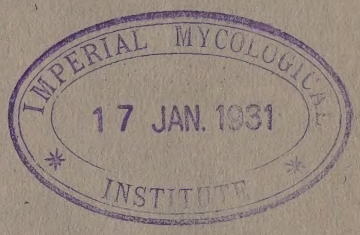
COLONY OF THE GAMBIA.



THE ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE YEAR 1929–30.

Price 5/-

PUBLISHED BY THE CROWN AGENTS FOR THE COLONIES,
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Caretaker Abuko	John Briggsman.

DEPARTMENT OF AGRICULTURE THE GAMBIA.

REPORT

OF THE

DIRECTOR OF AGRICULTURE

FOR THE YEAR ENDED MARCH 31ST, 1930.

CLIMATIC CONDITIONS.

The climatic conditions during 1929 were again favourable to all crops. The total average rainfall for the whole Protectorate was 56·56 inches, this being 15·03 inches in excess of the previous year.

THE AVERAGE MONTHLY RAINFALL THROUGHOUT THE PROTECTORATE FOR 1927, 1928 AND 1929 WAS AS FOLLOWS :—

	1927.	1928.	1929.	Decrease.	Increase.
May	2·57	0·68	0·47	0·21	—
June	4·98	2·55	9·04	—	6·49
July	5·73	8·00	11·38	—	3·38
August	16·37	14·53	21·31	—	6·78
September ...	11·59	11·68	11·73	—	0·05
October	7·35	3·49	2·63	0·56	—
November ...	1·16	0·60	Nil	0·60	—
Total ...	49·75	41·53	56·56	—	—

GENERAL AGRICULTURAL CONDITIONS.

GROUNDNUTS.

The growing season 1929 proved excellent for the cultivation of groundnuts. The bulk of the rain fell during the actual growing season and before ripening commenced.

The 1929–30 crop is of excellent high quality and shows a considerable increase in quantity over the previous year. The buying season opened on December 1st with a depressed market, due largely to the considerable increase in production of

groundnuts in India. Buying commenced at 1s. 10½d. to 2s. per bushel and quickly fell to 1s. to 1s. 3d. per bushel, this being the lowest price paid since 1915–16.

The total crop purchased was 77,082 tons, as compared with 57,505 tons for the previous year. These low prices naturally caused considerable depression among the farmers, as their common experience during the last few years has been that market prices are relatively high when the crop is below the average standard in quality, and low when the quality and quantity are above normal. This depression is reflected in the demands made for Government seed for next season's planting, which show a considerable drop below that of previous years, although the seed is to be issued at 12s. instead of 18s. per bag.

Annual Export of Groundnuts.

The actual export figures for the last five years excluding Saboya nuts shipped through this Port are as follows :—

Year.	Tons.
1925	46,583
1926	57,344
1927	65,107
1928	74,442
1929	56,355
1930	77,082*

The drop in tonnage for the year 1929 is unexplainable, as every effort was made to maintain the steady annual increase of the preceding years and climatic conditions were favourable. This fall in production was not confined to the Gambia, but was common throughout French Senegal, and there is no apparent factor to account for it. The total quantity of groundnuts purchased during the 1929/30 season was 77,082 tons, being the highest tonnage recorded since the establishment of the Agricultural Department in 1924.

Table Showing Quantity of Groundnuts Purchased in each Province, 1927/8, 1928/9, 1929/30.

Province.	Groundnuts. Tons. 1927–8.	Groundnuts. Tons. 1928–9.	Groundnuts. Tons. 1929–30.	Increase.	Decrease.
Upper River ...	22,469	16,023	17,670	1,647	—
South Bank ...	14,954	10,892	16,601	5,709	—
Kombo and Fogni	10,591	11,361	14,458	3,097	—
North Bank ...	15,172	11,231	15,050	3,819	—
McCarthy Island	12,200	7,998	13,303	5,305	—
Total ...	75,386	57,505	77,082	19,577	—

PRODUCE INSPECTION.

Attention was directed in my last Annual Report to the presence of numerous pieces of dried mud in groundnuts when brought to the trading stations. In the majority of cases this adulteration is deliberate and causes unnecessary

* Actual quantity purchased but not yet shipped.

congestion at the buying stations. The remedy is entirely in the hands of the Native Traders, and if they would refrain from buying produce adulterated in this way the farmers would soon cease this adulteration. A case was brought to my notice where adulterated produce was refused by one trader, but readily accepted by his neighbour. Until close co-operation is obtained between traders themselves the firms who employ them will have to continue to bear the expenses incurred in removing this form of adulteration. Produce Inspection continues to work satisfactorily and without friction. The quality of the present crop and the beneficial effect of Produce Inspection is strikingly demonstrated by the comparison of the following commercial analyses of cargoes shipped in 1924 and 1930 :—

	1924. Per cent.	1930. Per cent.
Dust	1·736	0·374
Foreign Matter	1·300	0·851
Excess Shell	0·816	Nil
	3·852	1·225
Fixed Allowance..	2·000	2·000
Allowance for Admixture	1·852	Nil
Allowance for Bad Kernels	4·056	0·371
Exception Allowance	3·042	Nil
Total Allowance made in favour of buyer	8·950	0·371

Thanks to the ready co-operation of the Bathurst Agents, no difficulties were experienced in the working of the Produce Inspection Ordinance during the year under review. The total crop purchased was 77,082 tons, and of this a total of 3,621 tons was ordered to be rescreened.

An allowance of 2 per cent. is allowed by the Rules of the Incorporated Oil Seed Association to cover " Dust," " Foreign Matter " and " Excess Shell." The Gambia crop for 1929/30 was well within this allowance, the total shipments giving an average of 1·78 per cent. under these heads.

STRANGE FARMERS.

The total number of Strange Farmers working in the Gambia during 1929 shows a decrease of 1,766. This falling-off was most marked in the Upper River Province, the actual decrease in that Province being 1,633 below the figure for the previous year. The Kombo and Fogni Province alone shows an increase of 306.

The following table shows their distribution :—

Province.	Actual Numbers.			Decrease.	Increase.
	1927.	1928.	1929.		
Upper River ...	5,498	7,154	5,521	1,633	—
McCarthy Island	1,665	2,097	2,030	67	—
South Bank ...	4,945	5,640	5,367	273	—
North Bank ...	2,229	2,644	2,545	99	—
Kombo and Fogni	2,900	3,105	3,411	—	306
Totals ...	17,237	20,640	18,874	—	—

GOVERNMENT GROUNDNUT SEED SUPPLY SCHEME.

Seed Distributed, 1929–30.

The quantity of groundnut seed distributed at the commencement of the rains by this Department was 20,209 four-bushel bags, as compared with 17,041 bags for the previous year. This distribution is justified by the increase in crop which has now been harvested. The total quantity of seed distribution during the last four years is given in the following table :—

Province.	1927.	Bags containing four Bushels.			Decrease.
		1928.	1929.	1930.	
Upper River ...	5,316	5,690	6,499	2,868	3,631
South Bank ...	5,163	7,150	8,614	2,693	5,921
McCarthy Island	2,800	3,117	4,000	3,000	1,000
Kombo and Fogni	471	684	696	200	496
North Bank ...	242	400	400	600	—
Totals ...	13,992	17,041	20,209	9,361	—

The seed requirements for 1930 only totalled 9,361 bags, this being less than half the quantity supplied the previous year. For some years past efforts have been made to encourage the farmers to save their own seed, but when the market price of groundnuts is high they prefer to sell all they have and to purchase from this Department their supplies for the following year. Owing to the low price paid for groundnuts the farmers retained large supplies of seed for their own use, and only purchased from this Department what seed was required for their Strange Farmers. Owing to the unavoidable delay in the writing of this report, it is possible for me now to estimate the crop for the coming season, and this certainly indicates that large quantities of seed were retained by the farmers, as much larger areas than usual have been planted, and I estimate the crop for 1930–31 to be between 80,000 and 85,000 tons.

Seed Nuts Distribution Scheme as at 31st March, 1930.

Expenditure.				Revenue.			
Particulars.	Amount.			Particulars.	Amount.		
	£	*s.*	*d.*		£	*s.*	*d.*
To 1,010 tons 9 cwts. Seed Nuts purchased by Government	12,302	14	0	*By* Balance of Reserve Fund to end of 1928/9	5,693	16	1
,, Bags purchased by Government, Season 1929/30 ...	1,041	15	8	,, Value of bags in Stock ...	789	17	6
,, Cost of Distribution : Porterage, Interest, etc., Season 1929/30	866	15	0	,, Receipts from Seed Nuts supplied during Season 1929/30 Repaid	17,670	16	6
,, Balance at the end of Season 1929/30	10,427	6	5	Outstanding	484	1	0
	£24,638	11	1		£24,638	11	1

PALM KERNELS.

Two varieties of palm kernels, thin-shelled and thick-shelled, were received from Nigeria, and plants are being raised with the object of establishing field trial plots of these two varieties for future use. The inspection of palm kernels offered for sale was continued and gave satisfaction to all concerned. There was an increase in the total quantity exported, as shown by the figures for the last five years :—

Year.	Tons.
1925	692
1926	676
1927	719
1928	615
1929	735

EXTENSION OF INTEREST IN AGRICULTURAL PRODUCTS.

Cotton (*Gossypium punctatum*).

Increased attention was devoted to the cultivation of cotton, and the areas under native cotton were increased in several districts. Cotton is not grown as an export crop at present, but is used for local consumption. This native cotton remains particularly free from insect attack and, owing chiefly to the conditions under which it is grown, remains a comparatively small plant, which matures early and is a prolific bearer.

Allen Cotton.

Trials were made with Allen cotton imported from Nigeria. Allen Long Staple and Native were planted for comparison. The Allen variety proved to be much more susceptible to insect attack and suffered more severely from stainer attacks. The native cotton also showed more resistance to the strong winds which were experienced during the growing period. Lint grown on our farms gave the following results :—

Percentage of Stained Cotton, Allen		28 per cent.
,, ,, ,, Native ..		10 ,,
Length of Lint, Allen	24·35 mm.	Average 27 mm.
,, ,, Native	18·32 mm.	Average 22 mm.

Further trials with Allen were made on native farms, under native conditions, by local farmers. The growth was much poorer than in the case of the native cotton and the length of lint varied from 10 mm. to 27 mm.

Sesamum.

The experimental field trials of five commercial varieties of sesamum, which have been continued since 1925, have now provided the necessary information to enable this crop to be successfully grown by the native farmer as a subsidiary crop for export.

A free distribution of seed was made to farmers who were willing to undertake this cultivation as an extra crop. The seed harvested was purchased by this Department from the farmers and a trial shipment of 4 tons 18 cwts. was made to Bordeaux through Messrs. Maurel Freres. This consignment proved satisfactory and realised £14 10s. 0d. per ton. From the technical report which follows it will be seen that simsim of good quality can be profitably grown in the Gambia :—

" To meet the requirements of the letter of Bordeaux dated the 7th of May, 1930, copy of which was sent to us, we took up some samples from the simsim received per S.S. ' *Ariadne.*'

" We get three kinds of seeds :—

Bags marked B.	Black Simsim.
Bags marked W.	White Simsim.
Bags marked M.	Motley (mixed).

" Hereunder we give you the results of the analysis of these three kinds of seeds, and, in addition, some of the results we found, for some other kinds, on previous examinations :—

Designations.	Greasy Substances.	Humidity.	Acidity.		Production Industrial Yield.
			1st.	2nd.	
Black Simsim B.	51·00	4·60	—	1·33	43–44·5
White Simsim W.	53·68	4·08	—	1·20	45–46
Motley Simsim M.	51·10	4·46	—	1·60	43–44·5
Black Bombay	49·00	4·82	2·30	5·00	40–41
White China	51·05	5·20	2·40	7·40	44–50
White Cassamance	51·92	4·20	2·10	9·00	44–53
Yellow Jaffa	55·50	3·90	0·70	5·10	48–49
Yellow Ingengold	51·04	4·18	2·10	6·80	43–50
Red Jubulpore	47·55	5·07	1·70	10·90	41

" The seeds we examined are of good quality.

" The white ones may be compared with the seeds of Konakry."

The following remarks made by Mr. H. C. Sampson, Economic Botanist at Kew, in his report on his recent visit to this Colony, are of general interest :—

" *Sesamum.*—This has recently been introduced as a possible alternative to groundnuts, and quite a successful trial crop was seen near McCarthy Island. It is quite possible that this will find a place in the local agriculture, as it is a plant which is indifferent to the season in which it is grown and it could therefore be used as a catch crop after an early cereal. If sown sufficiently thickly it can practically keep itself clean and thus may find favour in areas where labour for groundnuts is difficult to obtain. The main difficulty is in harvesting, which has to be done just at the right stage of ripening, otherwise the seed is very liable to shatter. Sesamum seed furnishes one of the best of the tropical cooking oils, and if this could be locally extracted, it would probably be found to be much cheaper than cotton seed and other edible oils which are now imported in increasing quantities.

" It may be said that such a local industry would decrease revenue from imports. This may be the case, but it is essential to the prosperity of the Gambia that it should be in a position to compete with the groundnut production of India. It must be able to produce cheaply, and therefore any reduction in the cost of foodstuffs will cheapen the cost of production."

Beeswax from the Gambia.

In my report for 1926–27 I drew attention to the efforts being made by this Department to re-establish the beeswax industry, which until the year 1921 flourished in this Colony. In that year the beeswax industry was declared an " obnoxious trade " by the Public Health Department, and this caused the four factories then working to close down. In 1909 the export of beeswax was 61,575 lbs. A commercial sample was recently prepared and submitted to the Imperial Institute, who reported as follows :—

" *Description.*

" The sample weighed 5 lb. and consisted of three circular slabs of beeswax, in clean condition and varying in colour from yellowish-brown to brown.

" *Results of Examination.*

" The wax as received was examined with the following results :—

	Per cent.
Loss on heating at 105° C.	Nil.
Ash	0·06
Matter soluble in boiling water	0·12
Dirt	0·10

" After being filtered at 100° C. through paper, the wax was found to have the following constants, which are shown in comparison with the ranges of corresponding figures for samples of beeswax from East and West Africa :—

—	Present Sample.	Samples from		
		East Africa.	Nigeria.	Sierra Leone.
Specific Gravity at 15°/15° C.	0·966	0·949 to 0·965 ...	—	—
Melting point (by open-tube method)...	65·0° C.	62·2° to 64·5° C.	63° to 65° C.	63° to 65° C.
Acid Value	19·2 ...	17·3 to 21·6 ...	15·6 to 20...	18·5 to 20
Saponification Value	97·3 ...	84·3 to 102·4 ...	—	—
Ester Value	78·1 ...	66·2 to 80·8 ...	75·3 to 78·4	72·8 to 76
Ratio of Acid Value to Ester Value ...	1 : 4·07...	1 : 3·6 to 4·2 ...	1 : 3·7 to 5	1 : 3·7 to 4
Iodine Value, per cent.	10·7 ...	6·1 to 10 ...	5·9 to 9·5...	—
Hydrocarbons (by Buisine's method), per cent.	12·4 ...	—	—	—
Salamon and Saeber's test	59·5° C.	60° to 61 C. ...	—	60·5 C.
Weinwurm's test	Solution slightly opal-escent.	—	—	—

" These results show that the present sample was of normal composition and had the usual characters of African beeswax.

" *Commercial Value.*

" The beeswax was submitted to (*a*) manufacturers and (*b*) brokers in London, who furnished the following observations respectively :—

" ' (*a*) We duly received your sample of Gambia beeswax, which we find to be pure and unadulterated.

" ' Provided the wax is supplied exactly as the sample, free from dross and impurities, its to-day's value would be £120 per ton, delivered net weights, bags free, c.i.f. London/Liverpool. The market has, however, declined steadily owing to the supply being considerably in excess of the demand. It is therefore uncertain whether as much as £120 per ton could be realised to-day. We are importing beeswax regularly, and if you can put us in touch with the actual producers or shippers, we would endeavour to place some of our orders with them.'

" ' (*b*) There is a very poor demand for this article at present and also rather heavy stocks, so that for the time being we should not recommend consignments. The value to-day would be roughly 120s. per cwt. ex-wharf London, less $2\frac{1}{2}$ per cent. and 1 per cent.

" ' We trust this information will be what you require, and should the shippers think of consigning to London, we shall be glad to take charge of same, but, as previously mentioned, we would not recommend a shipment at present, until we see signs of an improvement.'

" *Remarks.*

" In view of the good quality of this beeswax it would appear that consignments should be saleable in the United Kingdom in competition with supplies from other sources, but from the trade reports quoted above it will be seen that the market is at present overstocked and unfavourable for the ready disposal of consignments."

Messrs. Maurel Freres have reopened their beeswax factory and are prepared to purchase beeswax from the natives at reasonable prices based upon the condition of the wax and the ruling market value at the time. At the time of writing, 5d. per pound is being paid locally for clean samples.

Beeswax again appears in the list of exports, and during the year under review 6,485 lbs., valued at £318, were exported.

Papain from the Gambia.

A small quantity of papain was prepared from plants grown by the Department at Cape St. Mary, and submitted to the Imperial Institute, who reported as follows :—

" *Description.*

" The sample weighed 6 oz. and consisted of rather coarse powder, mostly of pale buff colour, but containing small light brown nodules.

" *Results of Examination.*

" The papain was chemically examined, with the following results :—

	Per cent.
Moisture	4·4
Ash	8·1
Nitrogen	10·7

" No starch or sugars were present.

"The proteolytic activity of the sample was compared, using the fibrin method, with that of four commercial samples of papain. The following ratios were obtained :—

Present Sample	1·0
Commercial Samples—	
(*a*)	0·97
(*b*)	0·95
(*c*)	0·88
(*d*)	0·88

"The present sample and each of the four commercial samples were separately shaken with cold water and the mixture allowed to settle. In all cases the material was only partially soluble. On allowing the suspensions to settle, the colour of the supernatant liquid and of the insoluble deposit in the case of the Gambia papain compared favourably with that of the commercial samples.

"*Remarks.*

"The proteolytic activity of the present sample of papain is slightly greater than that of the commercial samples of papain with which it was compared, and the colour is similar to that of the latter products. The colour of the aqueous solution is satisfactory, and the cleanness of the deposit compares favourably with that of the commercial samples.

"In view of the satisfactory nature of this product it would appear that the method of preparation employed is suitable, and if the quality of the papain can be maintained consignments should be saleable in the United Kingdom in competition with the ordinary grade of papain shipped from Ceylon, which is at present realising 7s. 6d. per lb. in London, less $2\frac{1}{2}$ per cent. discount at wharf."

Raffia from the Gambia.

A sample of raffia was prepared and submitted for technical and commercial report to the Imperial Institute, who reported as follows :—

"*Description.*

"The sample weighed $5\frac{1}{2}$ oz. and consisted of a loosely-plaited bundle of fibrous ribbons with the characteristic appearance of raffia. The ribbons were mainly 4 ft. 3 in. in length, and up to $\frac{3}{4}$ in. in width, but much of the sample was in the form of very narrow strands. The colour varied from pale creamy yellow to pale olive green at the tips.

The material was considerably inferior in strength to a commercial sample of raffia with which it was compared.

"*Commercial Value.*

"The raffia was submitted to two firms of importers in London, who furnished the following reports :—

> "'(1) In our opinion, the quality is not good enough for the English trade. Although fairly long, the bulk is very thin and almost useless. The greenish colour which runs for about a foot from the end is also detrimental, and the ends are left rough. It is not good enough for our use, but we should say the value, in London, would be about £30 per ton.

" ' (2) The raffia is of nice soft quality and is equal to third quality Majunga. My criticism is as follows : The proportion of waste at one end is too great. The cause of this is that the raffia is too green at the leaf tip end. It should be uniform in colour from one end to the other. Many of the strands are too narrow. This defect gives rise to many complaints from users.

" ' The raffia should be tied at the base end when bundled, and not at the leaf tip end. The raffia should be entirely freed from the leaf tips, as the latter add to the weight and are of no use to the worker.'

" At the time of the above reports raffia of good quality was quoted on the London market at £50 to £70 per ton.

" *Remarks.*

" It will be seen from the foregoing results that the present sample of raffia is not of sufficiently good quality to realise a high price on the London market, but that it should be possible to improve the preparation in such a way as to ensure a readily marketable product. It is important that the strips should be as wide as possible and that the leaf tips should be excluded. The Imperial Institute will be glad to be of further assistance, if so desired, in reporting on further samples or in marketing a trial consignment."

Imported Varieties of Groundnuts.

The field trials of improved varieties of groundnuts were continued and twenty-two varieties were grown and tested out for general cultivation.

Samples from the crop harvested were submitted to the Imperial Institute, and their report is as follows :—

" *Description.*

" The characters of the nuts and kernels in each sample are shown in the following table :—

Sample.	Weight. Lb.	Description of Nuts.	Description of Kernels.
Spanish No. 10 No. 18578	3	Mostly containing 2 kernels, a few only 1. Length $\frac{1}{2}$ to $1\frac{1}{2}$ inches, mostly 1 inch. Diameter $\frac{1}{4}$ to $\frac{1}{2}$ inch	Plump, small to medium. Skins pale pinkish-brown.
Big Japan ... No. 18579	3	Mostly containing 2 kernels, many 3 and a few 1. Length $\frac{3}{4}$ to $1\frac{5}{8}$ inches, mostly $1\frac{1}{8}$ to $1\frac{3}{8}$ inches. Diameter $\frac{3}{8}$ to $\frac{3}{4}$ inch.	Plump, small to large. Skins pinkish-brown.
Improved American No. 18583	$2\frac{1}{2}$	Mostly containing 2 kernels, a very few 3 and a few only 1. Length $\frac{3}{4}$ to $1\frac{1}{2}$ inches, mostly 1 to $1\frac{1}{2}$ inches. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Somewhat lacking in plumpness ; of medium size. Skins pinkish-brown, with brown markings; some wrinkled.

* Shrivelled, immature, undeveloped and mouldy kernels are included under the term " defective." The figure given is the percentage of the total number of kernels.

Sample.	Weight. Lb.	Description of Nuts.	Description of Kernels.
Spanish No. 8... No. 18581	3	Mostly containing 2 kernels, a few only 1. Length $\frac{5}{8}$ to $1\frac{1}{2}$ inches, mostly 1 inch. Diameter $\frac{1}{4}$ to $\frac{1}{2}$ inch.	Plump, small to medium. Skins pale pinkish-brown. 3 per cent. of the kernels were defective.*
Spanish No. 5 ... No. 18580	$2\frac{3}{4}$	Mostly containing 2 kernels, a few only 1. Length $\frac{1}{2}$ to 1 inch, mostly $\frac{7}{8}$ inch. Diameter $\frac{1}{4}$ to $\frac{3}{8}$ inch.	Plump, small to medium. Skins pale pinkish-brown.
Spanish No. 9 ... No. 18577	$3\frac{1}{2}$	Mostly containing 2 kernels, a few only 1. Length $\frac{1}{2}$ to 1 inch, mostly $\frac{7}{8}$ to 1 inch. Diameter $\frac{1}{4}$ to $\frac{3}{8}$ inch. Some broken nuts.	Plump, of medium size. Skins pale pinkish-brown. 4 per cent. of the kernels were defective.*
West African ... No. 18315	$2\frac{3}{4}$	Mostly containing 2 kernels, many 3 and a very few 1. Length $\frac{3}{4}$ to $1\frac{1}{2}$ inches, mostly $1\frac{1}{2}$ to $1\frac{3}{8}$ inches. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Slightly lacking in plumpness. Medium to large. Skins pinkish - brown with brown markings. 3 per cent. of the kernels were defective.*
Spanish Jalquan No. 18455	$2\frac{3}{4}$	Mostly containing 2 kernels, a very few 1. Length $\frac{1}{2}$ to $1\frac{1}{2}$ inches, mostly $\frac{7}{8}$ inch. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Plump, small to medium. Skins pale pinkish-brown.
Chinese 563 ... No. 18457	2	Mostly containing 2 kernels, a very few 1 or 3. Length $1\frac{1}{2}$ to $1\frac{5}{8}$ inches, mostly $1\frac{3}{8}$ inches. Diameter $\frac{3}{8}$ to $\frac{5}{8}$ inch.	Plump, large. Skins pinkish-brown. 4 per cent. of the kernels were defective.*
St. Vincent Local No. 18318	$2\frac{1}{2}$	Mostly containing 2 kernels, a very few 1. Length $\frac{5}{8}$ to $1\frac{1}{2}$ inches, mostly 1 inch. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Slightly lacking in plumpness. Medium to large. Skins pinkish - brown with brown markings ; slightly wrinkled.
Madagascar ... No. 18317	$2\frac{1}{2}$	Mostly containing 2 kernels, many 3, a very few 1. Length $\frac{5}{8}$ to $1\frac{5}{8}$ inches, mostly 1 inch. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Plump, medium to large. Skins pinkish - brown with some brown markings.
Barbados ... No. 18316	$2\frac{3}{4}$	Mostly containing 2 kernels, many 3. Length $\frac{7}{8}$ to $1\frac{3}{8}$ inches, mostly 1 to $1\frac{3}{8}$ inches. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Plump medium. Skins pinkish-brown with slight brown markings. 3 per cent. of the kernels were defective.*
Small Japan ... No. 18151	$3\frac{1}{4}$	Mostly containing 2 kernels, a few 1. Length $\frac{1}{2}$ to $1\frac{1}{8}$ inches, mostly $\frac{7}{8}$ inch. Diameter $\frac{1}{4}$ to $\frac{1}{2}$ inch.	Plump, medium. Deep reddish-brown.

* Shrivelled, immature, undeveloped and mouldy kernels are included under the term "defective." The figure given is the percentage of the total number of kernels.

Sample.	Weight. Lb.	Description of Nuts.	Description of Kernels.
Spanish Bunch No. 18586	3	Mostly containing 2 kernels, a few 1. Length $\frac{1}{2}$ to 1 inch, mostly $\frac{7}{8}$ inch. Diameter $\frac{1}{4}$ to $\frac{3}{8}$ inch.	Plump, small to medium. Skins pale pinkish-brown.
Big Japanese ... No. 18584	$2\frac{1}{2}$	Mostly containing 2 kernels, some 3, a few 1. Length $\frac{3}{8}$ to $1\frac{5}{8}$ inches, mostly $1\frac{1}{4}$ inches. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Someplump, otherslacking in plumpness. Medium to large. Skins pinkish-brown to brown; some wrinkled.
Spanish Poona No. 18585	3	Mostly containing 2 kernels, a very few only 1. Length $\frac{1}{8}$ to 1 inch, mostly $\frac{7}{8}$ to 1 inch. Diameter $\frac{1}{4}$ to $\frac{3}{8}$ inch.	Plump, medium. Skins pale pinkish-brown.
Small Japanese No. 18152	$2\frac{3}{4}$	Mostly containing 2 kernels, a very few 1. Length $\frac{1}{2}$ to 1 inch, mostly $\frac{3}{4}$ to $\frac{7}{8}$ inch. Diameter $\frac{1}{4}$ to $\frac{3}{8}$ inch.	Plump, medium. Skins deep reddish-brown.
Senegal 743 ... No. 18171	$2\frac{3}{4}$	Mostly containing 2 kernels, a few 1 or 3. Length $\frac{1}{2}$ to $1\frac{3}{4}$ inches, mostly $1\frac{1}{2}$ inches. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Mostly plump, a few lacking plumpness. Small to large. Skins pinkish-brown. 4 per cent. of the kernels were defective.*
Mauritius Local 746 No. 18589	3	Mostly containing 2 kernels. Length $\frac{1}{2}$ to 1 inch, mostly $\frac{7}{8}$ to 1 inch. Diameter $\frac{1}{4}$ to $\frac{1}{2}$ inch.	Plump, small to medium. Skins pinkish - brown with some brown markings.
Gudiatham Bunch No. 18170	3	Mostly containing 2 kernels, a very few 1. Length $\frac{1}{2}$ to 1 inch, mostly $\frac{7}{8}$ inch. Diameter $\frac{1}{4}$ to $\frac{3}{8}$ inch.	Plump, small to medium. Skins pale pinkish-brown.
Pande Chery ... No. 18587	3	Mostly containing 2 kernels, a very few 1 and a few 3. Length $\frac{5}{8}$ to $1\frac{1}{2}$ inches, mostly 1 to $1\frac{1}{4}$ inches. Diameter $\frac{3}{8}$ to $\frac{1}{2}$ inch.	Plump, small to large. Skins pinkish - brown with some brown markings. 6 per cent. of the kernels were defective.*
Falcon 755 ... No. 18153	$3\frac{1}{4}$	Mostly containing 2 kernels, a very few 1. Length $\frac{5}{8}$ to $1\frac{1}{8}$ inches, mostly $\frac{7}{8}$ inch. Diameter $\frac{1}{4}$ to $\frac{3}{8}$ inch.	Plump, medium. Skins pinkish - brown, with some brown markings. 3 per cent. of the kernels were defective.*

* Shrivelled, immature, undeveloped and mouldy kernels are included under the term "defective." The figure given is the percentage of the total number of kernels.

"*Results of Examination.*

"The following table indicates the composition of the nuts and kernels and the amounts of oil present :—

Sample.	Nuts.			Average Weight.	Moisture.	Oil in Kernels as received.	Oil expressed on moisture-free kernels.
	Husk.	Kernel.	Oil.				
	Per cent.	Per cent.	Per cent.	Grams.	Per cent.	Per cent.	Per cent.
Spanish No. 10	21·9	78·1	37·2	0·39	5·5	47·6	50·4
Big Japan (No. 18579)	25·2	74·8	37·3	0·56	5·6	49·8	52·8
Improved American	26·9	73·1	36·6	0·42	5·1	50·1	52·8
Spanish No. 8	21·7	78·3	37·6	0·37	5·2	48·0	50·6
Spanish No. 5	20·7	79·3	38·8	0·31	5·2	49·9	51·6
Spanish No. 9	21·1	78·9	38·0	0·38	5·6	48·1	51·0
West African	26·3	73·7	37·4	0·50	4·9	50·8	53·4
Spanish Jalquan	21·5	78·5	38·3	0·34	5·1	48·8	51·4
Chinese 563	27·2	72·8	36·6	0·75	5·0	50·2	52·8
St. Vincent Local...	26·4	73·6	36·6	0·43	5·3	49·7	52·5
Madagascar	26·9	73·1	37·1	0·41	5·2	50·8	53·6
Barbados	26·1	73·9	37·7	0·44	5·1	51·0	53·7
Small Japan (No. 18151) ...	19·5	80·5	40·2	0·40	4·9	49·9	52·5
Spanish Bunch	21·0	79·0	37·9	0·33	5·5	48·0	50·8
Big Japanese (No. 18584) ...	26·8	73·2	37·0	0·45	5·1	50·6	53·3
Spanish Poona	20·9	79·1	38·4	0·36	5·3	48·5	51·2
Small Japanese (No. 18152) ...	19·9	80·1	39·5	0·40	5·1	49·3	51·9
Senegal 743	27·7	72·3	36·7	0·44	4·7	50·8	53·3
Mauritius Local 746	23·2	76·8	39·6	0·38	5·1	51·6	54·4
Gudiatham Bunch	21·7	78·3	36·6	0·33	5·2	46·8	49·4
Pande Chery	26·8	73·2	36·6	0·51	5·1	50·0	52·7
Falcon 755	24·3	75·7	37·5	0·36	5·2	49·5	52·2

" The acidity of the extracted oils was as follows :—

Variety.	Acid value.	Free fatty acids (expressed as oleic acid).
		Per cent.
Spanish No. 10	0·7	0·35
Big Japan (No. 18579)	0·6	0·30
Improved American	1·3	0·65
Spanish No. 8	0·7	0·35
Spanish No. 5	1·3	0·65
Spanish No. 9	0·9	0·45
West African	0·5	0·25
Spanish Jalquan	2·5	1·26
Chinese 563	1·1	0·55
St. Vincent Local	1·5	0·75
Madagascar	0·7	0·35
Barbados	0·6	0·30
Small Japan (No. 18151)	1·3	0·65
Spanish Bunch	1·0	0·50
Big Japanese (No. 18584)	0·7	0·35
Spanish Poona	0·8	0·40
Small Japanese (No. 18152)	1·1	0·55
Senegal 743	0·4	0·20
Mauritius Local 746	0·5	0·25
Gudiatham Bunch	0·9	0·45
Pande Chery	0·6	0·30
Falcon 755	0·3	0·15

" *Remarks.*

" The largest and heaviest kernels in this series of samples were those of the variety Chinese 563 ; the kernels of these nuts were slightly larger than those of the samples of Big Japan (No. 18579), Pande Chery and West African. The smallest kernels were those of the variety Spanish No. 5.

" The percentages of defective kernels were in all cases low and were less than 2·5, except in the case of Spanish No. 8, West African, Barbados and Falcon, with 3 per cent. of defective kernels ; Spanish No. 9, Chinese 563 and Senegal with 4 per cent., and Pande Chery with 6 per cent.

" The percentages of husk in the nuts varied from 19·5 in the Small Japan (No. 18151) to 27·7 in the case of Senegal 743. For groundnuts in general the usual figure is about 23 per cent.

" The amounts of oil in the kernels were normal, varying from 47·6 per cent. in Spanish No. 10 to 51·6 per cent. in Mauritius 746. Calculated on the undecorticated nuts, the percentage of oil varied from 36·6 per cent. in Improved American, Chinese 563, St. Vincent Local, Gudiatham Bunch and Pande Chery, to 40·2 per cent. in Small Japan (No. 18151). Undecorticated groundnuts usually contained about 37 per cent. of oil.

" The extracted oils were in every case of normal appearance and of satisfactorily low acidity, the figures for free fatty acids being in all cases below 2 per cent. (expressed as oleic acid), which is regarded as the maximum desirable for oil from undecorticated groundnuts."

These results are very satisfactory and show that we have a large number of varieties suitable for general cultivation in the Gambia.

In view of the fact that efforts were made by the Trade some few years ago to induce us to replace the varieties grown in the Gambia by the " Senegal " variety, it is of special interest to note that this variety grown in the Gambia continues to produce the highest percentage of husk and which is above the maximum allowed by the Trade.

Chinese Groundnuts.

Some attention has been given to the question of developing a small export trade in special varieties of groundnuts suitable for the Confectionery trade.

Among the varieties under trial for this purpose are " Big Japan," " Chinese " and " Pande Chery."

The following letter and report from the Imperial Institute is of interest in this connexion :—

" The sample of hand-picked selected Chinese groundnuts sent to you in March last was stated to represent the best of the consignments received in London this year. The sample has been examined here and the results are given in the attached report.

" These hand-picked selected groundnuts in the shell are imported into this country from China for sale as nuts or for use in the confectionery trade ; they are not used for crushing purposes. They generally come in 20 to 25-ton lots, and the quantity shipped annually is comparatively small. As the nuts are not sold subject to oil content or extraneous admixture, no analyses of consignments are made in London.

" The residue of the Chinese crop of groundnuts is decorticated and sold on an admixture basis for crushing purposes, but the aggregate tonnage shipped annually is insignificant. The oil content of the kernels, as received in this country, ranges from 41·6 to 44·5 per cent., but varies somewhat from year to year.

" No trustworthy figures for the yield of nuts per acre in China appear to be available.

" *Hand-picked selected Groundnuts from China.*

" This sample of groundnuts was received from the Incorporated Oil Seed Association and was stated to represent the best of the consignments of Chinese hand-picked selected groundnuts received in London this year.

"*Description.*

"The sample weighed 14 lb. and consisted of undecorticated groundnuts in good clean condition, which varied in size from $\frac{3}{4}$ to $1\frac{3}{4}$ inches in length, and from $\frac{3}{8}$ to $\frac{5}{8}$ inches in diameter, being mostly from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in length and $\frac{1}{2}$ inch in diameter. Most of the nuts contained two kernels, the others only one. The kernels were large and plump and covered with a pinkish-brown skin; about 5 per cent. only were shrivelled or defective.

"*Results of Examination.*

"The nuts were composed of shell 31·6 per cent. and kernel 68·4 per cent. The average weight of a sound kernel was 0·70 gram.

"On analysis the following figures were obtained :—

	Per cent.
Moisture in kernels	5·4
Oil in kernels as received	46·4
Oil in moisture-free kernels	49·1
Oil in nuts as received	31·7

"*Remarks.*

"The results of the examination show that the kernels of this sample contain a higher proportion of oil than the usual range (41·6 to 44·5 per cent.) for Chinese decorticated groundnuts intended for crushing. As the hand-picked selected nuts are used for edible purposes and not for crushing, the oil content is not taken into consideration in their valuation and no analysis of consignments are available."

AGRICULTURAL SHOW, 1930.

The first agricultural show in this Colony was held in Bathurst on March 26th and 27th and proved a great success. Entries were limited to Bathurst and a radius of 20 miles, but each Province was permitted to forward a collective exhibit for competition. A total of 663 exhibits were entered for competition under the following sections :—

A.	Fruit and Flowers	49
B.	Vegetables	131
C.	Agricultural Produce	99
D.	Forest Produce	52
E.	Native Manufacture and Art	137
F.	Implements and Machinery	Nil
G.	Native-made Toys	108
H.	Ladies' Section	83
I.	Provincial Exhibits	4

Livestock was excluded. By kind permission of the Revd. Father Meehan, M.B.E., the show was held in the Roman Catholic Mission School, and the buildings and grounds were thronged each day with visitors. The Bathurst Firms responded generously to the appeal for contributions to the Prize Fund.

A Challenge Cup for annual competition for the best District Exhibit was presented by Sir Edward B. Denham, K.B.E., C.M.G. This was won by McCarthy Island Province. Five Silver Cups, seven Medals and £30 in cash were awarded as Special Prizes, in addition to cash prizes totalling £53 14s. 0d.

The Department of Agriculture staged an exhibit consisting of various varieties of rice, groundnuts, millets, guinea corn, benni seed, beeswax and up-to-date agricultural implements introduced from all parts of the world.

The thanks of this Department are due to the Receiver-General's Department, the Public Works Department, and to all those ladies and gentlemen who worked to make this show such an unqualified success. Arrangements are being made for the next Agricultural Show to be held in McCarthy Square, Bathurst, in February next.

GAMBIAN EXHIBIT, BRITISH INDUSTRIES FAIR.

Through the kind co-operation of the Gold Coast Government it was possible for the Gambia to participate for the first time in the British Industries Fair, London.

A collective exhibit representing this Colony's potentialities was prepared and forwarded to Lieut.-Colonel J. H. Levey, D.S.O., O.B.E., Director, Gold Coast Government Commercial Intelligence Bureau, London, to whom the thanks of this Department are due for the very able manner in which this exhibit was presented to the British public.

Colonel Levey reported as follows :—

"REPORT ON THE PARTICIPATION OF GAMBIA AT THE BRITISH INDUSTRIES FAIR, LONDON, 17TH TO 28TH FEBRUARY, 1930.

"At the request of His Excellency the Governor of the Gambia and with the permission of His Excellency the Governor of the Gold Coast, I undertook to include a representative exhibit of the Colony of the Gambia with that of the Gold Coast at the British Industries Fair.

"*Space Allotted.*—The total space allotted to the joint Exhibit was about 200 square feet, of which the Gambia Exhibit occupied about 80 square feet. It was considered desirable to keep the exhibits of the Gambia separate so as not to confuse the visitors. A photograph of the stand, taken from the side, is enclosed, which shows the main Gambia Exhibit as seen when approaching the stand from the main entrace.

"*Situation of the Exhibit.*—The joint exhibit formed part of the general lay-out of stands contained in the main entrance hall occupied by the Empire Marketing Board, and was given a most prominent position between the stands of Australia and the Irish Free State. Other Dominions and Colonies exhibiting under the auspices of the Empire Marketing Board were : Australia, South Africa, New Zealand, India, Canada, Northern Ireland, Cyprus, The West Indies, East African Dependencies, Southern Rhodesia, Malaya, and Mauritius.

"*Nature of Exhibits.*—Great credit is due to the Department of Agriculture for the splendid way in which the exhibits were selected, packed and organised. The whole of the exhibits arrived in splendid condition and were easily identified by the numbers and lists attached.

"The exhibits had been selected with very great care, and when placed on view looked most attractive, especially the exhibits of beeswax, groundnuts, rice and the assorted grains and beans.

"In addition to the exhibits sent from the Colony, I was fortunate in obtaining some excellent photographs kindly lent by Sir Cecil Armitage, K.B.E., C.M.G., D.S.O., late Governor of the Colony, who has always been ever ready to assist in

loaning exhibits for West Africa. In addition, I was able to exhibit a very fine representative native woven cloth and a Chief's sword, kindly lent by a sister of Captain Jeffs, M.C., of the Political Service.

" *Visit of H.M. The Queen, Princess Mary, The Duke of York.*—Her Majesty The Queen, accompanied by other members of the Royal Family, paid a visit to the stand and remarked that she had not noticed the Gambia at any previous Fair. Her Majesty expressed her pleasure at seeing the exhibit of the Colony and was very interested in the products exhibited.

" During the Fair the stand was visited by the Lord Mayor, the Lord Privy Seal, the Prime Minister, the Secretary of State for the Colonies, and many hundreds of other distinguished statesmen and business men. Probably the most interested visitors were Sir Edward and Lady Denham, to whom the Colony owes its participation at this wonderful Fair. Nothing seemed to have pleased Sir Edward Denham more than to feel that his late ' little Colony ' had made such a good show amongst its bigger brothers. No doubt Sir Edward was filled with pride and satisfaction to think that by bringing the Gambia before the British manufacturing and business public, there was a great opportunity not being missed of enabling the British people in London to know something of the Gambia and at the same time enhance increased business between the United Kingdom and the Colony.

" Other visitors included business men from such countries as France, Germany, Poland, Denmark, Sweden, Norway, Italy, Holland. Unsolicited expressions of appreciation of the exhibits of the Gambia were continuous from the first day to the last.

" *Business Enquiries.*—Several merchants and manufacturers examined very carefully the many exhibits, and in some cases samples were taken away for further inspection. Enquiries in particular were made for Groundnuts and Beeswax. It is hoped that, as the result of the exhibit, increased business will result in these two commodities between the United Kingdom and the Colony. In these days of increased competition in Empire products from foreign Colonies, there is, in my opinion, a necessity for educating the British public in regard to the need for ensuring that every possible purchase made by the United Kingdom of tropical commodities, the purchaser should consider the advisability of buying from our own Colonies.

" I attach herewith copies of correspondence relating to enquiries from British firms who are interested in the purchase of Groundnuts and Beeswax from the Gambia.

" *Cost of the Exhibit.*—A sum of £10 was allotted to me for expenses to meet the Exhibit of the Gambia. I am glad to say that this sum was all that was needed for this exhibit. Vouchers for the amount expended are being forwarded under separate cover to the Treasurer, through the Crown Agents.

" *Storing of the Exhibits.*—In accordance with instructions from the Honourable the Colonial Secretary, the exhibits, less some groundnuts, which have been sent to prospective buyers, and the sample of beeswax, which has been handed to the British Wax Refining Company for experiment, have all been packed and stored in the Gold Coast Government Commercial Intelligence Bureau.

(Signed) " J. H. LEVEY,
" *Director,*
" *Gold Coast Government Commercial Intelligence Bureau.*"

GAMBIA SOIL SURVEY.

The work in connexion with the soil survey of the Gambia commenced in 1928 was carried a stage further during the year. The report received from the Imperial Institute dealing with the last 18 soil samples forms an appendix to this report.

Mr. H. C. Doyne, Agricultural Chemist, Sierra Leone, to whom these soil analyses were submitted for comparison with other West African soils, commented as follows :—

" I have the honour to make the following observations on the figures for the analyses of soils from the Gambia.

" It seems almost amazing that any normal crop can grow on these soils at all, particularly those from Cape St. Mary. The average combined clay and silt content being somewhere in the neighbourhood of 4·6 per cent. The figures for nitrogen, phosphoric acid and organic matter are appreciably lower than those for soils in Sierra Leone, although, oddly enough, the figures for available potash are not as low as would be expected in soils so markedly deficient of the finer fractions.

" The effect of manures seems negligible except in the case of the dried blood, but as the figures for this particular plot when untreated are not to hand, it is hard to give a definite statement on this point.

" It would be interesting to see the effect of calcium cyanamide on these soils as regards nitrogen, *p*H and exchangeable calcium. On the whole, it seems obvious that the most useful manures on these soils would be some form of bulky organic matter, and that some form of irrigation, if at all practicable, would be very desirable.

" The soils from Kuntaur and Kudang appear to be appreciably heavier than those from Cape St. Mary, with a higher organic matter and, consequently, nitrogen content, and it is interesting to see that in the third and fourth foot of the Kudang soil there is an appreciable amount of clay. In other respects these soils appear to be much the same as those from Cape St. Mary."

AGRICULTURAL EDUCATION AND TRAINING.

The training of a number of youths at Cape St. Mary Station has been continued and promising results are now being obtained. The outdoor gardening work continues to be an important feature of the training at the Armitage School, Georgetown, and at the Government Vernacular School, Bakau.

AGRICULTURAL TRAINING OF GOVERNMENT TEACHERS.

Under the new education scheme for the training of teachers in elementary schools, arrangements were made for agricultural knowledge to form an important part of this training. This work is being undertaken by the staff of the Agricultural Department, who visit Bathurst regularly for the purpose of giving lectures to the teachers. The teachers attend the Agricultural Station, Cape St. Mary, when possible, where they receive more practical instruction than is possible in a lecture room, and where they can follow closely the field work being undertaken in connexion with the general agricultural problems of the Colony.

CATTLE DISEASE.

Arrangements were made with the Government of Nigeria for Mr. W. V. Earnshaw, M.R.C.V.S., of the Nigerian Veterinary Department, to pay an official visit to this Colony for the purpose of making a survey of animal diseases throughout the Protectorate. Mr. Earnshaw remained in the Colony from 2nd to 15th August, 1929.

The official report submitted by Mr. Earnshaw, together with further comments and suggestions made by the Chief Veterinary Officer, Northern Provinces, Nigeria, forms an appendice to this report. From the information contained therein it will be seen that Rinderpest is responsible for the heavy losses incurred each year among the herds of cattle. Definite suggestions are made for establishing a Veterinary Service in this Colony, and it is earnestly hoped that our financial position will soon justify the establishment of such an important service.

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION ON AGRICULTURAL MATTERS.

Registered communications numbering 1,290 were dealt with at the Director's office during the year.

Expenditure and Revenue, 1929

The votes of the Department of Agriculture for the year under review were as follows :—

	Vote. £	*Actual Expenditure.* £ s. d.
Personal Emoluments	4,226	3,786 3 11
Sea Passages	280	260 0 0
Transport and Travelling Allowances	630	489 0 1
Miscellaneous Requisites	100	94 10 2
Scientific Apparatus	100	9 3 4
Plants, Seeds, Fertilizers, Chemicals for plant disinfection ..	200	144 4 1
Labour	1,520	1,464 0 10
Technical Library	10	7 12 3
Tools, Implements and Machinery	50	35 2 10
Uniforms	85	32 8 9
Tree Planting in Bathurst ..	100	85 11 3

The revenue derived from sale of plants and seeds was £195 17s. 8d.

The total expenditure for the year was £6,407 17s. 6d., being £893 2s. 6d. below the approved estimate.

STAFF CHANGES.

The Director proceeded on leave on 3rd July and returned to the Colony on 27th January, 1930.

Mr. F. W. Hall, Plantation Manager, Department of Agriculture, Uganda, was appointed Assistant Director and took up his duties on 15th October, 1929.

Mr. T. R. Hayes, Agricultural Superintendent, proceeded on leave on 11th July, 1928, at the expiration of which he proceeded to Trinidad to take a Course at the Imperial College of Tropical Agriculture. Mr. Hayes was awarded the Associateship of the Imperial College of Tropical Agriculture, and returned to the Colony on 15th August, 1929.

Agricultural Overseers.—Karamo Sanneh resigned his position to become Chief of Soma. The appointments of the following officers were terminated upon the reduction in the number of Seed Farms :—Yorromang Sagnia, Baba Balde, Secku Sarr and Lamin Ceesay.

METEOROLOGY.

The following are summaries of the observations recorded at the Agricultural Station, Cape St. Mary, for the year ending 31st December, 1929 :—

Rainfall.—The total rainfall for the year was 52·42 inches, being 0·90 in excess of that for the previous year.

The first shower fell on 11th June, when 0·14 inch was registered. The highest rainfall recorded in one day was 18th August, when 5·38 inches were registered. The rains finished on 23rd October, and no rain fell in November, but three very light showers fell during December. The rain ceasing in October was very favourable for the ripening of the groundnuts, and this is largely responsible for the excellent quality of the crop reaped.

Temperature.—The mean maximum temperature for the year was 83·2°, being 0·6° above that for the previous year. The minimum was 69·3°, being 1·3° below that of the previous year. The hottest month of the year was June, when the mean maximum was 87·7°. The extreme maximum shade temperature recorded was 99° on 25th March, and the minimum shade temperature 60° on 20th November.

Humidity.—The mean relative humidity was 66·7 per cent., being 1·5 in excess of that for 1928. The monthly mean range being 43 per cent. in December and 89 per cent. in June.

The usual Meteorological Report for 1929 follows :—

METEOROLOGICAL REPORT FOR 1929.

Department of Agriculture, The Gambia.

Hours of Observation 9·00 a.m.

Station Cape St. Mary. 16° 40′ 24″ 13° 29′ 04″ H. 52.31.

Months.	Air Temperature.							Dry bulb temperature.	Vapour Pressure.	Relative Humidity.	Rainfall.	No. of days in which rain fell.
	Means.		Mean.	Absolute.								
	Max.	Min.		Max.	Date.	Min.	Date.					
									Inches.		Inches.	
January	83·8	66·2	75·0	93	29th	64	1st & 3rd	73·3	0·060	54	—	—
February	83·1	65·2	74·2	93	9th,27th	62	7th	74·2	0·486	55	—	—
March ...	78·1	66·1	72·1	99	25th	64	19th, 20th 21st	73·2	0·512	58	—	—
April ...	77·7	66·3	71·9	81	1st	64	5th, 6th & 17th	74·1	0·528	62	—	—
May ...	78·2	69·2	73·7	86	23rd	67	1st, 2nd, 3rd, 4th & 11th	75·9	0·630	70	0·06	1
June ...	87·7	73·2	80·4	91	29th	70	13th, 20th, 23rd, 24th	78·1	0·769	89	4·00	6
July ...	84·3	77·3	80·8	88	30th	70	23rd	81·1	0·863	80	7·42	15
August ...	83·1	73·2	78·2	91	28th	66	29th	78·1	0·824	84	25·23	26
September	85·1	69·1	77·1	88	21st	65	16th & 19th	81·2	0·840	80	12·58	19
October...	86·2	70·4	78·3	91	21st	66	7th	83·0	0·806	72	2·57	9
November	86·2	68·8	77·5	91	4th, 5th	58	23rd & 28th	78·2	0·523	53	—	—
December	85·1	66·9	76·0	91	15th	61	16th	74·7	0·356	43	0·22	3
Totals	998·6	831·9	915·2	1083	—	777	—	925·1	7·197	800	52·08	79
Means ...	83·2	69·3	76·3	90·3	—	64·8	—	77·1	0·600	66·7	—	—

Main Sea Level determined from readings taken at gauge, Bathurst, over periods 1st January to 31st December, 1928.

VISITS BY THE AGRICULTURAL ADVISER TO THE SECRETARY OF STATE AND THE ECONOMIC BOTANIST, KEW.

We were particularly fortunate during the year in obtaining visits by Mr. F. A. Stockdale, Agricultural Adviser to the Secretary of State, and Mr. H. C. Sampson, Economic Botanist, Kew. These officers, who were attending the West African Agricultural Conference and visiting some of the other West African Colonies, spent some days in visiting the Protectorate with a view to offering suggestions for the further agricultural development of the country. Valuable reports were submitted, and the writer had the opportunity, when in London, of discussing with these officers some of the more important problems requiring solution, such as ploughing and irrigation.

CONCLUSION.

It gives me pleasure again to record my thanks to the following Directors, whose Departments have rendered valuable assistance during the year under review:—Royal Botanic Gardens, Kew; Imperial Institute of Entomology; Imperial Bureau of Mycology; Imperial Institute; Departments of Agriculture, Trinidad, Gold Coast, Nigeria and Sierra Leone. I desire to express my sincere thanks to all members of my staff, both African and European, for the loyal and efficient way in which they have carried out their various duties.

(Sgd.) ARCHIBALD J. BROOKS,
Director.

August 27th, 1930.

APPENDICES.

M. 3264/2.

14th December, 1929.

Sir,

I have the honour to enclose herewith a report on the results obtained at the Imperial Institute in the examination of 18 samples of soil from the Gambia, which were received from the Director of Agriculture and referred to in his letters, Ag. S.S. 1202/1927 and Ag. X. 460/1929.

This report completes to date the examination of the soil samples received so far from the Gambia.

I am, Sir,

Your obedient Servant,

(Sgd.) LT.-GEN. SIR WM. FURSE,
Director.

His Excellency The Governor,
The Gambia,
British West Africa.

SOILS FROM THE GAMBIA.

The eighteen samples of soil which are the subject of the following report were sent to the Imperial Institute by the Acting Director of Agriculture of the Gambia, and are referred to in his letter No. Ag. S.S. 1202/1927 of 24th December, 1927.

In addition to ordinary soil survey samples, a number of samples were included from manurial experimental plots, and from areas where Rosette disease was incident. It was requested that they should be analysed.

The soils were submitted to chemical and mechanical analysis, with the results shown in the following schedules :—

Reference : No. 170, Plot No. 1, 1st 12 inches. (Bone meal.)

Description : Reddish sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

——	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·04
" Fine earth "	Under 2·0	99·96

MECHANICAL ANALYSIS OF " FINE EARTH."

——	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	75·47	75·29
Fine sand	0·2 to 0·02	19·32	19·28
Silt	0·02 to 0·002	1·10	1·00
Clay	0·002 and under	4·15	3·53
Moisture at 105° C....		0·19	0·19
Matter soluble in water‡		0·02	0·02
Loss by solution in HCl		0·04	0·04
Calcium carbonate		—	—
Loss on ignition*		—	1·09
Total		100·29	100·44

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ Containing sulphates equivalent to sulphuric anhydride (SO_3) ... ... per cent.
Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil very faintly acid, pH value ... 6·58 (Quinhydrone method).
6·82 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

		Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
		Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime	CaO	—	—	—	0·045
Magnesia	MgO	—	—	—	0·004
Potash	K_2O	—	—	—	0·007
Soda	Na_2O	—	—	—	0·014
Ferric oxide... ...	Fe_2O_3	—	—	—	0·003
Alumina	Al_2O_3				
Phosphoric acid ...	P_2O_5	—	0·012	509	—
Silica	SiO_2	—	—	—	—
Manganous oxide ...	MnO	—	—	—	0·001

		Total.	
		Per cent.	Lb. per Acre.
Nitrogen	N	0·019	806
Organic carbon ...	C	0·17	7,212
Organic matter* ...		0·31	—
Carbon dioxide ...	CO_2	Nil	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, } C}{\text{Nitrogen, } N}\right. = 10·6.$

Composition of Clay Fraction* (0·002 mm. and under, separated by sedimentation).

		Per cent.
Silica	SiO_2	37·05
Alumina	Al_2O_3	29·69
Ferric oxide	Fe_2O_3	8·72
Titanium dioxide	TiO_2	1·88
Manganous oxide	MnO	N.D.
Lime	CaO	
Magnesia	MgO	
Potash	K_2O	
Soda	Na_2O	
Loss on ignition		20·80
Total		98·14

* Composite sample.

Molecular ratio $\left\{\frac{\text{Silica, } SiO_2}{\text{Alumina, } Al_2O_3}\right. = 2·11.$

Reference : No. 161, Plot No. 2, 1st 12 inches. (Nitrogen and phosphate.)

Description : Reddish sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·03
" Fine earth "	Under 2·0	99·97

MECHANICAL ANALYSIS OF " FINE EARTH."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	76·91	76·79
Fine sand	0·2 to 0·02	18·62	18·58
Silt	0·02 to 0·002	1·27	1·15
Clay	0·002 and under ...	3·43	2·95
Moisture at 105° C.		0·23	0·23
Matter soluble in water‡		0·005	0·005
Loss by solution in HCl		0·04	0·04
Calcium carbonate		—	—
Loss on ignition*		—	0·95
Total		100·50	100·69

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Faintly acid, pH value ... ... 6·02 (Quinhydrone method).
6·07 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

—		Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
		Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime	CaO	—	—	—	0·036
Magnesia	MgO	—	—	—	0·004
Potash	K_2O	—	—	—	0·008
Soda	Na_2O	—	—	—	0·017
Ferric oxide... ...	Fe_2O_3	—	—	—	0·002
Alumina	Al_2O_3				
Phosphoric acid ...	P_2O_5	—	0·005	212	—
Silica	SiO_2	—	—	—	—
Manganous oxide ...	MnO	—	—	—	0·002

		Total.	
		Per cent.	Lb. per Acre.
Nitrogen	N	0·018	764
Organic carbon ...	C	0·22	9,333
Organic matter* ...		0·39	—
Carbon dioxide ...	CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 14{\cdot}3.$

Reference : No. 159, Plot No. 3, 1st 12 inches. (Nitrogen, phosphoric acid and potash.)

Description : Reddish sandy soil.

Preliminary Mechanical Analysis on the Entire Soil, which was Air-dried before Examination.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·01
" Fine earth "	Under 2·0	99·99

Mechanical Analysis of " Fine Earth."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	68·20	68·07
Fine sand	0·2 to 0·02	26·40	26·34
Silt	0·02 to 0·002	1·12	1·25
Clay	0·002 and under ...	3·98	3·23
Moisture at 105° C.		0·13	0·13
Matter soluble in water‡		0·02	0·02
Loss by solution in HCl		0·08	0·08
Calcium carbonate		—	—
Loss on ignition*		—	1·23
Total		99·93	100·35

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Faintly acid, pH value ... ... 5·98 (Quinhydrone method).
6·01 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

—		Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
		Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime	CaO	—	—	—	0·027
Magnesia	MgO	—	—	—	0·002
Potash	K_2O	—	—	—	0·012
Soda	Na_2O	—	—	—	0·013
Ferric oxide... ...	Fe_2O_3	—	—	—	0·006
Alumina	Al_2O_3				
Phosphoric acid ...	P_2O_5	—	0·004	170	—
Silica	SiO_2	—	—	—	—
Manganous oxide ...	MnO	—	—	—	0·002

		Total.	
		Per cent.	Lb. per Acre.
Nitrogen	N	0·018	764
Organic carbon ...	C	0·26	11,029
Organic matter* ...		0·47	—
Carbon dioxide ...	CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 16 \cdot 9.$

Reference : No. 151, Plot No. 4, 1st 12 inches. (Phosphoric acid and potash.)

Description : Reddish sandy soil.

Preliminary Mechanical Analysis on the Entire Soil, which was Air-dried before Examination.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·04
" Fine earth "	Under 2·0	99·96

Mechanical Analysis of " Fine Earth."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	73·97	73·85
Fine sand	0·2 to 0·02	21·83	21·77
Silt	0·02 to 0·002	1·00	0·97
Clay	0·002 and under ...	3·18	2·43
Moisture at 105° C.		0·09	0·09
Matter soluble in water‡		0·03	0·03
Loss by solution in HCl		0·05	0·05
Calcium carbonate		—	—
Loss on ignition*		—	0·98
Total		100·15	100·17

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
{ Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Faintly acid, pH value ... ... { 5·63 (Quinhydrone method).
{ 5·92 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·019
Magnesia ... ... MgO	—	—	—	0·001
Potash ... ... K_2O	—	—	—	0·011
Soda ... ... Na_2O	—	—	—	0·012
Ferric oxide... ... Fe_2O_3	—	—	—	trace
Alumina ... ... Al_2O_3				
Phosphoric Acid ... P_2O_5	—	0·005	—	—
Silica ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·002

	Total.	
	Per cent.	Lb. per Acre.
Nitrogen ... ... N	0·015	648
Organic carbon ... C	0·23	9,945
Organic matter* ...	0·41	—
Carbon dioxide ... CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 17·7.$

Reference : No. 162, Plot No. 5, 1st 12 inches. (Lime.)

Description : Reddish sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

——	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·03
" Fine earth "	Under 2·0	99·97

MECHANICAL ANALYSIS OF " FINE EARTH."

——	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	72·20	72·11
Fine sand	0·2 to 0·02	23·14	23·09
Silt	0·02 to 0·002	1·33	1·50
Clay	0·002 and under ...	3·10	2·48
Moisture at 105° C.		0·31	0·31
Matter soluble in water‡		0·01	0·01
Loss by solution in HCl		0·09	0·09
Calcium carbonate		—	—
Loss on ignition*		—	0·80
Total		100·18	100·39

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Acid, pH value ... ... { 5·62 (Quinhydrone method).
{ 5·68 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·020
Magnesia ... ... MgO	—	—	—	0·002
Potash ... ... K_2O	—	—	—	0·010
Soda ... ... Na_2O	—	—	—	0·010
Ferric oxide... ... Fe_2O_3	—	—	—	0·002
Alumina ... ... Al_2O_3				
Phosphoric acid ... P_2O_5	—	0·001	43	—
Silica ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·002

	Total.	
	Per cent.	Lb. per Acre.
Nitrogen ... ... N	0·014	605
Organic carbon ... C	0·20	8,647
Organic matter* ...	0·37	—
Carbon dioxide ... CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{1\cdot0}{5\cdot5}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 16\cdot5.$

Reference : No. 169, Plot No. 6, 1st 12 inches. (Nitrogen and potash.)

Description : Reddish sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·03
" Fine earth "	Under 2·0	99·97

MECHANICAL ANALYSIS OF " FINE EARTH."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	70·62	70·53
Fine sand	0·2 to 0·02	24·70	24·66
Silt	0·02 to 0·002	1·00	1·08
Clay	0·002 and under	3·15	2·55
Moisture at 105° C.		0·16	0·16
Matter soluble in water‡		0·02	0·02
Loss by solution in HCl		0·08	0·08
Calcium carbonate		—	—
Loss on ignition *		—	0·82
Total		99·73	99·90

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Acid, pH value ... ... { 5·10 (Quinhydrone method).
5·20 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

—		Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
		Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime	CaO	—	—	—	0·002
Magnesia	MgO	—	—	—	0·002
Potash	K_2O	—	—	—	0·011
Soda	Na_2O	—	—	—	0·014
Ferric oxide... ...	Fe_2O_3	—	—	—	0·006
Alumina	Al_2O_3				
Phosphoric acid ...	P_2O_5	—	0·003	130	—
Silica	SiO_2	—	—	—	—
Manganous oxide ...	MnO	—	—	—	0·002

		Total.	
		Per cent.	Lb. per Acre.
Nitrogen	N	0·016	692
Organic carbon ...	C	0·19	8,215
Organic matter* ...		0·35	—
Carbon dioxide ...	CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 13·9.$

Reference: No. 168, Plot No. 7, 1st 12 inches. (Dried blood.)

Description: Reddish sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

——	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·04
"Fine earth"	Under 2·0	99·96

MECHANICAL ANALYSIS OF "FINE EARTH."

——	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	70·40	70·26
Fine sand	0·2 to 0·02	23·27	23·23
Silt	0·02 to 0·002	1·23	1·27
Clay	0·002 and under ...	4·15	3·23
Moisture at 105° C.		0·20	0·20
Matter soluble in water‡		0·03	0·03
Loss by solution in HCl		0·11	0·11
Calcium carbonate		—	—
Loss on ignition*		—	1·59
Total		99·39	99·92

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil: Very faintly acid, pH value ... { 6·65 (Quinhydrone method).
{ 6·73 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

		Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
		Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime	CaO	—	—	—	0·105
Magnesia	MgO	—	—	—	0·008
Potash	K_2O	—	—	—	0·009
Soda	Na_2O	—	—	—	0·013
Ferric oxide... ...	Fe_2O_3	—	—	—	trace
Alumina	Al_2O_3				
Phosphoric acid ...	P_2O_5	—	0·010	424	—
Silica	SiO_2	—	—	—	—
Manganous oxide ...	MnO	—	—	—	0·003

		Total.	
		Per cent.	Lb. per Acre.
Nitrogen	N	0·040	1,697
Organic carbon ...	C	0·45	19,090
Organic matter* ...		0·82	—
Carbon dioxide ...	CO_2	Nil	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 13{\cdot}1.$

Reference: No. 166, Plot No. 8, 1st 12 inches. (Superphosphate.)

Description: Reddish sandy soil.

Preliminary Mechanical Analysis on the Entire Soil, which was Air-dried before Examination.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·04
"Fine earth"	Under 2·0	99·96

Mechanical Analysis of "Fine Earth."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	67·68	67·58
Fine sand	0·2 to 0·02	26·79	26·74
Silt	0·02 to 0·002	1·35	1·37
Clay	0·002 and under ...	3·55	2·98
Moisture at 105° C.		0·32	0·32
Matter soluble in water‡		0·01	0·01
Loss by solution in HCl		0·08	0·08
Calcium carbonate		—	—
Loss on ignition*		—	0·81
Total		99·78	99·89

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil: Acid, pH value ... ... { 5·77 (Quinhydrone method).
{ 5·61 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·039
Magnesia ... ... MgO	—	—	—	0·006
Potash ... ... K_2O	—	—	—	0·008
Soda ... ... Na_2O	—	—	—	0·012
Ferric oxide... ... Fe_2O_3	—	—	—	0·006
Alumina ... ... Al_2O_3				
Phosphoric acid ... P_2O_5	—	0·003	127	—
Silica... ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·002

	Total.	
	Per cent.	Lb. per Acre.
Nitrogen ... ... N	0·020	848
Organic carbon ... C	0·23	9,757
Organic matter* ...	0·42	—
Carbon dioxide ... CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 13·6.$

Reference: No. 167, Plot No. 9, 1st 12 inches. (Basic slag.)

Description: Reddish sandy soil.

Preliminary Mechanical Analysis on the Entire Soil, which was Air-dried before Examination.

——	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·02
" Fine earth "	Under 2·0	99·98

Mechanical Analysis of " Fine Earth."

——	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	62·99	62·90
Fine sand	0·2 to 0·02	31·20	31·12
Silt	0·02 to 0·002	1·30	1·23
Clay	0·002 and under ...	4·13	3·45
Moisture at 105° C.		0·24	0·24
Matter soluble in water‡		0·02	0·02
Loss by solution in HCl		0·08	0·08
Calcium carbonate		—	—
Loss on ignition*		—	0·93
Total		99·96	99·97

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil: Very faintly acid, pH value ... { 6·52 (Quinhydrone method).
6·57 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·039
Magnesia ... ... MgO	—	—	—	0·004
Potash ... ... K_2O	—	—	—	0·008
Soda ... ... Na_2O	—	—	—	0·008
Ferric oxide... ... Fe_2O_3	—	—	—	0·005
Alumina ... ... Al_2O_3				
Phosphoric acid ... P_2O_5	—	0·006	255	—
Silica... ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·002

	Total.	
	Per cent.	Lb. per acre.
Nitrogen ... ... N	0·017	721
Organic carbon ... C	0·19	8,060
Organic matter* ...	0·35	—
Carbon dioxide ... CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 13{\cdot}2.$

Reference : No. 163, Plot No. 10, 1st 12 inches. (Control.)

Description : Reddish sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

——	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·31
" Fine earth "	Under 2·0	99·69

MECHANICAL ANALYSIS OF " FINE EARTH."

——	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	76·81	76·64
Fine sand	0·2 to 0·02	18·77	18·73
Silt	0·02 to 0·002	0·95	1·02
Clay	0·002 and under ...	3·25	2·68
Moisture at 105° C.		0·17	0·17
Matter soluble in water‡		0·02	0·02
Loss by solution in HCl		0·05	0·05
Calcium carbonate		—	—
Loss on ignition *		—	1·09
Total		100·02	100·40

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Faintly acid, pH value ... ... 6·41 (Quinhydrone method).
6·44 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·041
Magnesia ... ... MgO	—	—	—	0·005
Potash ... ... K_2O	—	—	—	0·008
Soda ... ... Na_2O	—	—	—	0·010
Ferric oxide... ... Fe_2O_3	—	—	—	0·002
Alumina ... ... Al_2O_3				
Phosphoric acid ... P_2O_5	—	0·005	212	—
Silica ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·001

	Total.	
	Per cent.	Lb. per Acre.
Nitrogen ... ... N	0·021	891
Organic carbon ... C	0·21	8,908
Organic matter* ...	0·37	—
Carbon dioxide ... CO_2	Nil	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 11 \cdot 4.$

Remarks On Soils From Experimental Plots.

These ten samples of soil are all very similar in physical characteristics, and they also resemble closely the soil from the Agricultural Station, Cape St. Mary, previously examined at the Imperial Institute (*see* Imperial Institute report M. 3201, dated 25th September, 1928). They are all extremely sandy, the amount of clay rarely exceeding 4 per cent. Soluble salts are very low in all cases. The water-holding capacity of all the soils is very poor.

All the soils are acid to a varying degree, the *p*H values ranging between 6·82 in No. 170 and 5·20 in No. 169. It is noteworthy that the varying acidity cannot be correlated with the fertiliser treatment of the different plots, the plot receiving lime being much more acid than the control, while the plot receiving basic slag is very slightly less acid.

As regards chemical composition, the amounts of " exchangeable " lime are generally low, being of about the same magnitude in the control (No. 12), the bone meal (No. 1), the nitrogen and phosphate (No. 2), the superphosphate (No. 8), and the basic slag (No. 9) plots, while they are even lower in the nitrogen, phosphate and potash (No. 3), the phosphate and potash (No. 4), and the lime (No. 5) plots, and are extremely low in the nitrogen and potash (No. 6) plot. The amount of lime is decidedly higher in the dried blood (No. 7) plot, this being the only one in which the quantity of this element might be regarded as sufficient. The amount of " exchangeable " magnesia is very low in all cases.

The quantities of " exchangeable " potash are rather low, but remain fairly constant throughout the series of soils. Potash is not markedly deficient in any case, but it does not appear to be higher in those plots receiving potash manures than in the others.

There is a very small and practically constant amount of manganese among the exchangeable bases. This quantity may probably be regarded as about the normal amount in soils of this type.

The amounts of nitrogen are low in all cases except in the dried blood plot (No. 7), even in those plots receiving nitrogen in other forms. The nitrogen in the dried blood has evidently remained in the soil to a much greater extent than the other nitrogenous fertilisers, but there is no indication as to whether this nitrogen is readily available for plant nutrition.

Organic matter is also low in amount except in the plot which had received a dressing of dried blood. The ratio of carbon to nitrogen is very varied, ranging from 10·6 (bone meal plot, No. 1) to 17·7 (phosphate and potash plot, No. 4). The variations are, however, not in excess of those previously found in soils from the Gambia.

The amount of available phosphoric acid is moderate in the control (No. 10) plot, being similar in the nitrogen and phosphate (No. 2), the phosphate and potash (No. 4), and the basic slag (No. 9) plots. The quantities are lower in the nitrogen, phosphate and potash (No. 3), the nitrogen and potash (No. 6), and the superphosphate (No. 8) plots, and are very low in the lime (No. 5) plot. The only plots in which this constituent is present in really good supply are the bone meal (No. 1) and the dried blood (No. 7) plots.

Of the fertiliser applications, only the dried blood and, to a smaller extent, the bone meal treatments seem to have had any marked effect on the composition of the soil. Superphosphate, and lime in particular, appear to have had no appreciable action. This result is probably due to the very small amount of clay present in these soils. It is generally considered that the clay exerts a kind of

" fixing " or adsorbent action on soluble fertiliser compounds, rendering these compounds less liable to be washed out of the soil by rain, but in these soils the amount of clay is so small that this " fixing " action must be negligible. The rapid loss of potash from those soils to which it has been added, as shown in the similarity of the amounts of potash now present in all the soils, is probably also due to this solvent action. It appears, therefore, that if the fertilisers applied do not benefit the immediate crop, there is little prospect of any residual effect. The heavy and concentrated rainfall which is characteristic of the Gambia would of course intensify this leaching effect.

Owing to the similarity of all these soils, and the small amount of clay present, the clay fraction for analysis was separated from a composite sample of all the ten soils. This analysis is recorded with the chemical analysis of Plot No. 1. It may be observed that the composition of this clay fraction is very similar to that of the clay separated from soil No. 720 from the Agricultural Station, Cape St. Mary, to which reference has already been made.

From these results it appears probable that, owing to the peculiar conditions of the soil and climate prevalent in the Gambia, treatment with most artificial fertilisers is not likely to be satisfactory, and the rapid loss of their soluble constituents would appear likely to make prohibitive any attempt to use them on a large scale. The chief need of all the soils seems to be for supplies of humus, which would probably be best applied by a good green manure crop, but the general conditions are adverse to the conservation of this constituent.

It is not clear from the data supplied whether the fertilisers used were applied at the rate of 4 cwt. gross weight per acre or the equivalent of 4 cwt. of the fertilising elements. In addition, it is probable that one plot only for each treatment is not sufficient for satisfactory conclusions to be drawn. Fertilising experiments on a number of small plots, using when possible equivalent amounts of the manurial constituents, would probably give better and more conclusive results.

Reference : No. 693, Kuntaur, 1st 12 inches. (Rosette investigation.)

Description : Brown sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·63
"Fine earth"	Under 2·0	99·37

MECHANICAL ANALYSIS OF "FINE EARTH."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	37·73	37·57
Fine sand	0·2 to 0·02	47·35	47·18
Silt	0·02 to 0·002	6·97	6·83
Clay	0·002 and under ...	7·68	5·95
Moisture at 105° C.		0·59	0·59
Matter soluble in water‡		0·060	0·060
Loss by solution in HCl		0·22	0·22
Calcium carbonate		—	—
Loss on ignition*		—	1·82
Total		100·60	100·22

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Practically neutral, pH value ... 7·17 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·101
Magnesia ... ... MgO	—	—	—	0·018
Potash ... ... K_2O	—	—	—	0·013
Soda ... ... Na_2O	—	—	—	0·023
Ferric oxide ... Fe_2O_3	—	—	—	0·004
Alumina ... ... Al_2O_3				
Phosphoric acid ... P_2O_5	—	0·010	424	—
Silica ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·007

	Total.	
	Per cent.	Lb. per Acre.
Nitrogen ... ... N	0·039	1,654
Organic carbon ... C	0·48	20,362
Organic matter* ...	0·87	—
Carbon dioxide ... CO_2	Nil	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 14·3.$

Composition of Clay Fraction (0·002 mm. and under, separated by sedimentation).

	Per cent.
Silica... ... ... SiO_2	40·62
Alumina ... ... Al_2O_3	27·97
Ferric oxide ... ... Fe_2O_3	8·08
Titanium dioxide ... ... TiO_2	2·03
Manganous oxide ... ... MnO	N.D.
Lime ... ... CaO	
Magnesia ... ... MgO	
Potash ... ... K_2O	
Soda ... ... Na_2O	
Loss on ignition	20·02
Total	98·72

Molecular ratio $\left\{\frac{\text{Silica, } SiO_2}{\text{Alumina, } Al_2O_3}\right. = 2·46.$

Reference: No. 694, Kuntaur, 1st 12 inches. (Rosette investigation.)

Description: Brown sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·92
"Fine earth"	Under 2·0	99·08

MECHANICAL ANALYSIS OF "FINE EARTH."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	45·73	45·51
Fine sand	0·2 to 0·02	40·64	40·46
Silt	0·02 to 0·002	4·65	4·48
Clay	0·002 and under ...	7·80	6·10
Moisture at 105° C.		0·56	0·56
Matter soluble in water‡		0·061	0·061
Loss by solution in HCl		0·28	0·28
Calcium carbonate		—	—
Loss on ignition*		—	1·87
Total		99·72	99·32

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil: Very faintly acid, pH value ... 6·74 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·097
Magnesia ... ... MgO	—	—	—	0·018
Potash ... ... K_2O	—	—	—	0·016
Soda ... ... Na_2O	—	—	—	0·021
Ferric oxide... ... Fe_2O_3	—	—	—	0·002
Alumina ... ... Al_2O_3				
Phosphoric acid ... P_2O_5	—	0·016	714	—
Silica... ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·008

	Total.	
	Per cent.	Lb. per Acre.
Nitrogen ... ... N	0·031	1,383
Organic carbon ... C	0·45	20,069
Organic matter* ...	0·83	—
Carbon dioxide ... CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 17·2.$

Reference: No. 700, Kuntaur, 1st 12 inches. (Rosette investigation.)

Description: Brown sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

——	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·30
" Fine earth "	Under 2·0	99·70

MECHANICAL ANALYSIS OF " FINE EARTH."

——	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	39·37	39·24
Fine sand	0·2 to 0·02	48·74	48·55
Silt	0·02 to 0·002	4·17	4·32
Clay	0·002 and under ...	6·93	5·13
Moisture at 105° C....		0·48	0·48
Matter soluble in water‡		0·058	0·058
Loss by solution in HCl		0·19	0·19
Calcium carbonate		—	—
Loss on ignition*		—	1·75
Total		99·94	99·72

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil: Very faintly acid, pH value ... 6·95 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

	Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
	Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime ... ... CaO	—	—	—	0·084
Magnesia ... ... MgO	—	—	—	0·015
Potash ... ... K_2O	—	—	—	0·018
Soda ... ... Na_2O	—	—	—	0·021
Ferric oxide... ... Fe_2O_3	—	—	—	0·001
Alumina ... ... Al_2O_3				
Phosphoric acid ... P_2O_5	—	0·002	86	—
Silica ... ... SiO_2	—	—	—	—
Manganous oxide ... MnO	—	—	—	0·007

	Total.	
	Per cent.	Lb. per Acre.
Nitrogen ... ... N	0·033	1,427
Organic carbon ... C	0·33	14,268
Organic matter* ...	0·59	—
Carbon dioxide ... CO_2	Nil	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{55}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 11·5.$

Reference : No. 704, Kuntaur, 1st 12 inches. (Rosette investigation.)

Description : Brown sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·61
"Fine earth"	Under 2·0	99·39

MECHANICAL ANALYSIS OF "FINE EARTH."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	42·49	42·39
Fine sand	0·2 to 0·02	45·96	45·82
Silt	0·02 to 0·002	5·13	5·20
Clay	0·002 and under ...	6·00	4·88
Moisture at 105° C.		0·47	0·47
Matter soluble in water‡		0·035	0·035
Loss by solution in HCl		0·15	0·15
Calcium carbonate		—	—
Loss on ignition*		—	1·50
Total		100·24	100·45

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Acid, pH value ... ... 5·92 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

—		Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
		Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime	CaO	—	—	—	0·055
Magnesia	MgO	—	—	—	0·014
Potash	K_2O	—	—	—	0·010
Soda	Na_2O	—	—	—	0·018
Ferric oxide... ...	Fe_2O_3	—	—	—	0·005
Alumina	Al_2O_3				
Phosphoric acid ...	P_2O_5	—	Trace	Less than 20	—
Silica	SiO_2	—	—	—	—
Manganous oxide ...	MnO	—	—	—	0·007

		Per cent.	
		Per cent.	Lb. per Acre.
Nitrogen	N	0·024	1,038
Organic carbon ...	C	0·21	9,080
Organic matter* ...		0·38	—
Carbon dioxide ...	CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{100}{58}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 10 \cdot 2.$

Remarks on Soils from Kuntaur District.

These four soils are all very similar as regards their mechanical composition, being of the very sandy type which appears to be characteristic of the Gambia. The amounts of soluble salts, although fairly low, are higher than is frequently the case.

The acidity varies a good deal. None of these soils can be regarded as very acid, and the reaction of No. 693 is practically neutral.

As regards chemical composition, there is considerable variation among the four soils. Nos. 693 and 694 are fairly well supplied with " available " phosphoric acid, but this constituent is markedly deficient in Nos. 700 and particularly 704. The amounts of " exchangeable " lime are moderate, except in No. 704, in which it is rather low, and the quantities of magnesia remain almost constant throughout the series. Potash is present in about the normal amounts for Gambia soils.

There is again a small amount of manganese among the exchangeable bases, comparable with that observed in the samples previously examined at the Imperial Institute (Imperial Institute Report M. 3264/1 of 1st August, 1929).

The amounts of nitrogen and of organic matter are again very low and the ratios of carbon to nitrogen vary widely.

Owing to the similarity in physical character of these four soils, the clay fraction was separated for analysis from one only, No. 693. The ratio of silica to alumina in this clay is comparable with other values recorded in the Gambia soils examined at the Imperial Institute.

The chief requirements of these soils appear to be organic matter and, in the case of Nos. 700 and 704, phosphoric acid.

The composition of these soils appears to support the theory tentatively advanced in the previous report (Imperial Institute Report M. 3864/1 of 1st August, 1929) that the presence of a small amount of readily soluble manganese may affect the incidence of " Rosette " disease of groundnuts.

It will be seen that the percentage of this constituent in these soils is higher than that found in any of those of the previous series (manurial experiments) in this report.

Reference : No. 300, Kudang, 1st 12 inches.

Description : Brown sandy soil.

Preliminary Mechanical Analysis on the Entire Soil, which was Air-dried before Examination.

——	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·10
" Fine earth "	Under 2·0	99·90

Mechanical Analysis of " Fine Earth."

——	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	36·61	36·46
Fine sand	0·2 to 0·02	51·99	51·86
Silt	0·02 to 0·002	4·37	4·35
Clay	0·002 and under ...	7·03	5·45
Moisture at 105° C....		0·46	0·46
Matter soluble in water‡		0·06	0·06
Loss by solution in HCl		0·20	0·20
Calcium carbonate		—	—
Loss on ignition*		—	1·58
Total		100·72	100·42

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Faintly acid, pH value ... ... { 6·11 (Quinhydrone method).
{ 6·08 (Hydrogen electrode method).

Chemical Analysis of "Fine Earth."

		Soluble in Hydrochloric Acid.	Available constituents, *i.e.*, Portion Soluble in 1 per cent. Citric Acid Solution.		Exchangeable bases (Hissink method).
		Per cent.	Per cent.	Lb. per Acre.	Per cent.
Lime	CaO	—	—	—	0·072
Magnesia	MgO	—	—	—	0·017
Potash	K_2O	—	—	—	0·015
Soda	Na_2O	—	—	—	0·019
Ferric oxide... ...	Fe_2O_3	—	—	—	0·005
Alumina	Al_2O_3				
Phosphoric acid ...	P_2O_5	—	0·008	339	—
Silica	SiO_2	—	—	—	—
Manganous oxide ...	MnO	—	—	—	0·008

		Total.	
		Per cent.	Lb. per Acre.
Nitrogen	N	0·030	1,273
Organic carbon ...	C	0·35	14,848
Organic matter* ...		0·63	—
Carbon dioxide ...	CO_2	N.D.	—

* Obtained by multiplying the figure for organic carbon by $\frac{1.0.0}{5.5}$.

The figures for lb. per acre of the various constituents in the above table are calculated for a depth of 12 inches of soil, the apparent specific gravity of the soil being taken into consideration.

Atomic ratio $\left\{\frac{\text{Carbon, C}}{\text{Nitrogen, N}}\right. = 13·5.$

Composition of Clay Fraction (0·002 mm. and under, separated by sedimentation).

		Per cent.
Silica	SiO_2	42·38
Alumina	Al_2O_3	26·87
Ferric oxide	Fe_2O_3	7·15
Titanium dioxide	TiO_2	1·97
Manganous oxide	MnO	N.D.
Lime	CaO	
Magnesia	MgO	
Potash	K_2O	
Soda	Na_2O	
Loss on ignition		19·20
Total		97·57

Molecular ratio $\left\{\frac{\text{Silica, } SiO_2}{\text{Alumina, } Al_2O_3}\right. = 2·67.$

Reference : No. 708, Kudang, 2nd 12 inches.

Description : Light brown sandy sub-soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·14
" Fine earth "	Under 2·0	99·86

MECHANICAL ANALYSIS OF " FINE EARTH."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	34·74	34·64
Fine sand	0·2 to 0·02	52·15	52·02
Silt	0·02 to 0·002	3·50	3·56
Clay	0·002 and under ...	8·75	7·37
Moisture at 105° C.		0·38	0·38
Matter soluble in water‡		0·09	0·09
Loss by solution in HCl		0·18	0·18
Calcium carbonate		—	—
Loss on ignition*		—	1·72
Total		99·79	99·96

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Faintly acid, pH value ... ... { 6·21 (Quinhydrone method).
{ 6·38 (Hydrogen electrode method).

Reference : No. 709, Kudang, 3rd 12 inches.

Description : Light brown sandy sub-soil.

Preliminary Mechanical Analysis on the Entire Soil, which was Air-dried before Examination.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·04
"Fine earth"	Under 2·0	99·96

Mechanical Analysis of "Fine Earth."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	27·59	27·50
Fine sand	0·2 to 0·02	45·61	45·48
Silt	0·02 to 0·002	5·75	5·40
Clay	0·002 and under ...	20·83	18·70
Moisture at 105° C.		0·51	0·51
Matter soluble in water‡		0·06	0·06
Loss by solution in HCl		0·14	0·14
Calcium carbonate		—	—
Loss on ignition*		—	2·99
Total		100·49	100·78

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Acid, pH value ... ... { 5·73 (Quinhydrone method).
{ 5·87 (Hydrogen electrode method).

Reference : No. 710, Kudang, 4th 12 inches.

Description : Light brown sandy soil.

PRELIMINARY MECHANICAL ANALYSIS ON THE ENTIRE SOIL, WHICH WAS AIR-DRIED BEFORE EXAMINATION.

—	Size of Particles in mm.	Per cent.
Stones and gravel	Over 2·0	0·07
" Fine earth "	Under 2·0	99·93

MECHANICAL ANALYSIS OF " FINE EARTH."

—	Size of Particles in mm.	Fractions dried at 105° C.	Fractions ignited.
		Per cent.	Per cent.
Coarse sand	2·0 to 0·2	31·69	31·34
Fine sand	0·2 to 0·02	39·33	39·10
Silt	0·02 to 0·002	5·93	5·57
Clay	0·002 and under ...	23·20	20·23
Moisture at 105° C.		0·69	0·69
Matter soluble in water‡		0·06	0·06
Loss by solution in HCl		0·09	0·09
Calcium carbonate		—	—
Loss on ignition*		—	4·05
Total		100·99	101·13

* Not including moisture at 105° C. or CO_2 from carbonates.

‡ { Containing sulphates equivalent to sulphuric anhydride (SO_3) ... per cent.
‡ { Containing chlorides equivalent to chlorine (Cl) ... ... per cent.

Reaction of soil : Faintly acid, pH value ... ... { 6·01 (Quinhydrone method).
6·08 (Hydrogen electrode method).

REPORT ON CATTLE DISEASE IN GAMBIA COLONY.

(By Chief Veterinary Officer, Nigeria.)

With reference to the report submitted by Mr. W. V. Earnshaw, Veterinary Officer, on his survey of animal diseases in the Gambia Colony.

It is quite certain that a Veterinary staff is required, and the minimum staff of European Officers that would allow of continuity in the work would be two European Officers.

In view of the fact that the Colony is isolated it would be essential to have a Senior Officer in charge with some years' experience of West African conditions, to allow of the application of his experience rapidly to build up an efficient service. The second officer could be either a less experienced Veterinary Officer or a selected Stockman with considerable experience in a West African Colony. As an alternative to this scheme, it might be considered more in the interest of Gambia Colony to have additional staff paid by Gambia, forming part of an existing West African Veterinary organisation, and the latter supplying experienced officers in Gambia to organise and carry on a Veterinary service.

In addition to the cost of salaries, pensions and passages of the European officers, funds would also be required for Native Field Assistants, Instruments, Equipment, purchase of animals for experimental purposes, etc. etc. An initial annual expenditure of approximately £2,500 is estimated to cover the cost, exclusive of pensions.

The methods to be adopted to deal with the diseases existing would best be evolved by the officer detailed to Gambia after he had some experience of the local conditions, and any sera or vaccines could probably be supplied in the first place by the Vom Laboratory.

It would be advisable to have some natives trained in a Colony where there are suitable facilities for acquiring experience of field work in the immunisation of animals. Natives who are accustomed to handling animals, who also have a knowledge of English, would probably be the most suitable type to benefit by a course of training; this should be for a period of not less than six months, to qualify them to act as Field Assistants to the Veterinary Officer.

I attach a detailed estimate of the approximate cost of such a scheme.

(Initialed) W. W. H. (Henderson),
Chief Veterinary Officer,
Northern Provinces.

Report on Cattle Disease in Gambia Colony.

I have the honour to submit the following on my investigation into cattle disease in the Gambia, and to recommend such steps as I think should be taken to combat disease and reduce the high mortality amongst cattle in the Gambia.

I reached Bathurst from England on the 2nd August and proceeded up river to Kudang, in the Eastern Niamina District of South Bank Province. On the 6th August I proceeded to Georgetown, in McCarthy Island Province, accompanied by Major L. A. W. Brooks, Travelling Commissioner, and, making Georgetown a base, examined cattle in the districts of Upper Niani and Fulladu West, where disease was then reported. I found this disease to be Rinderpest. On the 10th August I proceeded to Basse, in the Upper River Province. I there discussed cattle affairs with Capt. T. W. Doke, Assistant Travelling Commissioner. Proceeding to the district of Wuli, I examined cattle which were recovering from the disease. This disease also proved to be Rinderpest.

Cattle owners were closely questioned as to the diseases they encountered amongst their cattle. By describing symptoms to the owners, I found they were able to recognize and give the names of various diseases met with in the Gambia. The conditions found correspond to those found in other parts of West Africa. The following is a list of cattle diseases known to the cattle owners of the Gambia, and met with amongst their cattle. The Fula name is given, together with the name in English where the latter is known. In some cases, it will be noted, it has not yet been ascertained what the condition is.

Rinderpest or Tcharu F.—This disease was definitely diagnosed in three separate areas. It was introduced into the country many years ago in the form of a great epidemic, which almost decimated the cattle population of the Gambia. The history since then has been outbreaks of the disease on epidemic scale at intervals of a few years. Following a large outbreak there is a large number of immune cattle in the country, and the disease is confined to small foci scattered throughout the districts. In the few years following a large outbreak, the young susceptible stock are increasing in number, until again there is a large proportion of susceptible animals in the Colony. Rinderpest then spreads from one or more of the small foci of infection or is introduced into the Colony from French territory.

The cattle owners are much afraid of this disease, and would welcome any effective steps taken to prevent their cattle dying from the disease. Fortunately, with this disease steps can be taken to lessen the heavy mortality which occurs through its ravages.

Pleuro-pneumonia of Cattle or Joffe F.—This disease is due to a specific organism bordering on the ultra-visible and affects only bovines. I did not meet with a case whilst in the Colony. The cattle owners, however, know it and could give the dates when their cattle were last attacked. In the herds examined, the experience was that they had not had the disease for varying periods of 5, 7 and 10 or more years. The owners speak of a big outbreak in the year 1917, but state that it was immediately followed by Rinderpest, and a great number of cattle died.

The native owners practice a method of vaccination which has been known to the natives of Africa for hundreds of years. Briefly, it is to take a piece of infected lung from a beast that has died, and mixing this with the leaves and bark of certain trees, they insert it under the skin of the nose. Following this operation they burn a sear in the form of a ring around the site of inoculation to prevent the spread of subsequent swelling. Animals which react favourably, as evinced by a small swelling at the site of inoculation, on recovery are said to be immune. Commonly, however, the swelling increases in size, and passing beyond control, involves the whole head and further. In these cases death is the usual result.

Even in so-called favourable cases the immunity is somewhat doubtful, and for this reason and on account of the terrible pain and suffering experienced by the animal in unfavourable cases, this method of vaccination should not be encouraged.

There seems little doubt that, in many cases, cattle which were " carriers " of this disease were killed off as the result of Rinderpest.

Trypanosomiasis or Dasoo F.—In a country like the Gambia, where Tse-tse flies are very numerous along the banks of the river, and where the cattle are living in and in close proximity to the " fly " belts, it is to be expected that they would become infected with Trypanosomes.

The cattle owners met with recognized a condition in which their animals become thin and in some cases die. They believe this is due to numerous Tse-tse flies biting the cattle, which weaken and die from continuous loss of blood. This, of course, is probably due to infection with Trypanosomes.

Although blood smears, taken from animals in various parts, were examined microscopically, no parasites were found. The only thing to be said of this is that no Trypanosomes were found, as a negative microscopical examination of the blood does not preclude the possibility of Trypanosomes infection.

The cattle I examined, which were of the non-humped type, and which were living in or close to " fly " belts, looked healthy and in good condition. It is possible, however, that these cattle, having been in contact with Tse-tse fly for many generations, may have resistance to Trypanosomes infection and only break down to the disease when some other adverse condition lowers their vitality. An example of such a condition would be Rinderpest. This theory has a distinct bearing on the control and eradication of Rinderpest and will be dealt with later in this report.

It is significant that the cattle owners state that if they introduce the humped cattle of the Zebu type from the interior, they will not live long owing to the attacks of the Tse-tse fly. These humped cattle are, presumably, susceptible to Trypanosomiasis, having previously lived in areas free from Tse-tse fly.

The three diseases mentioned above are the most important to be met with in the Gambia. The following conditions are also met with :—

Kurrel F. is a condition thought by the natives to be due to a " devil " in the bush shooting their cattle. It is characterized by sudden death in animals that appeared healthy a short time previously. The condition is known in other parts of West Africa. It may be Anthrax, Blackquarter, Septicæmia Hæmorrhagicum (a per-acute form), or Snake Bite.

Kuffel F.—This disease is characterized by the animal showing a condition of ague or shivering and turning in a circle with the head lowered to one side. There is a possibility of plant poisoning being the cause here.

Woppere F.—This name is given by the Fula cattle people to Abortion in cattle. The abortion may be due to the Bacillus Abortous of Bang, or to such diseases as Rinderpest and Septicæmia, or to injuries.

Fetchereb F. or Foot Rot.—This disease is identical in the clinical appearance and symptoms with Bacillary Necrosis of the Foot in cattle.

Bakale F.—In this condition swelling of the joints of limbs is a prominent feature, and the cattle people associate it with abortion. It is of interest to note that the condition is known to the Fulani people of Northern Nigeria under exactly the same name.

Yendeh F.—This is a condition which is probably the same as that known in England as Blackquarter, and due to a specific organism. The main symptom

seen is a swelling, usually situated on one of the quarters. This swelling crepitates on manipulation, due to the presence of gas formed by the bacteria in the lesion. On opening the swelling the underlying muscle tissue presents a blackened appearance and emits a peculiar odour.

Nyorre F. is a disease of the skin due to an organism of the Streptothrix type and is known as Streptothricosis. It is more prevalent during the rainy season.

Dodoel F. or Septicæmia Hæmorrhagica.—Due to the Bacillus Bovisepticus, an organism of the Pasturella group. The usual history is that only a few animals in a herd are attacked and they invariably die. Occasionally a high mortality in a herd is experienced. The main symptom noted by the cattle owner is a swelling of the throat and neck, which may extend to the Sternum and Abdomen.

Naunari F.—In this condition the chief symptom is the passing of red-coloured urine, fever and emaciation. It is a tick-borne disease known as Piroplasmosis, or Redwater. As a rule it is only in young calves that any mortality is experienced. After recovery from an attack is gained most adult cattle are immune.

Petel F. or Foot Rot in Sheep and Goats.—This is the same condition as Fetchereh in cattle.

The cattle owners speak of Joffe or Pleuro-pneumonia affecting goats and sheep. The two conditions, however, are not the same. That affecting cattle is specific for bovines. The pneumonia they speak of in goats is probably Contagious Pleuro-pneumonia of Goats.

Amongst horses the natives recognized Trypanosomiasis, Influenza and Lymphangitis. Whether the latter is Epizootic or Ulcerative Lymphangitis requires further investigation.

In the above list of diseases the main symptoms mentioned are those recognized by the cattle owners. It is not considered necessary in this report to give a full description of these diseases.

Turning to the question of what steps should be taken to control and prevent disease amongst the cattle in the Gambia, I am of the opinion that if any lasting benefit is to be conferred on the cattle owners in the Colony, a permanent Veterinary Staff should be engaged. This might consist in the first instance of a Veterinary Officer of some years' experience in tropical work and particularly in Rinderpest control. This officer could enrol and train a staff of selected natives in the recognition of diseases and methods adopted for the control and prevention of the various conditions met with. In order to obtain continuity of work, a second Veterinary Officer might be required later. The Veterinary Staff should be provided with proper equipment.

Rinderpest being the most important disease at the moment in the Colony, and causing greatest loss to cattle owners, endeavours should be made to control it as soon as possible, and an organized and continuous policy should be carried out. It is certain that the simultaneous method of inoculation, *i.e.*, the use of Virus and Anti-rinderpest Serum at one and the same time, would be the only one of any use in the Gambia. In this method adult animals, after reacting to the double inoculation, are, on recovery, immune for life.

The use of Anti-rinderpest Serum alone is not practical, owing to the constant danger of the disease being reintroduced from French territory, and the heavy and constant expense of the Anti-rinderpest Serum.

I understand that the question of obtaining Anti-rinderpest Serum from Nigeria is under consideration, and the immediate inoculation of cattle in the Gambia. I would advise against this course being adopted at the present time, for the following reasons :—

In the double inoculation of cattle against Rinderpest the disease is conferred on the animals in a mild form. Whilst reacting to the inoculation they are a

source of infection to healthy susceptible animals and require to be quarantined for one month after the inoculation. It has been the experience in Africa generally that it is an almost impossible matter to get the native cattle owners to carry out the proper isolation of sick cattle, unless under the supervision of a European. Under the present conditions, if inoculations were to be carried out in the Gambia, it would mean the creating of several foci of infection scattered through the Colony, and it would be impossible to ensure the proper isolation of the reacting cattle, and there would be grave danger of the disease being spread to surrounding healthy cattle. Were this to occur it would have an extremely bad effect on the native cattle owner, who, besides losing a large number of cattle, would have little confidence in our methods of helping him. It would be a slow process regaining that confidence.

Were a Veterinary Officer and a trained native staff to be permanently available, the campaign against Rinderpest could be properly organized and controlled, and great benefit be conferred on the cattle owners in the Gambia.

Again, as previously mentioned, there is the possibility of the Gambia cattle being in some measure resistant to Trypanosomiasis and chronic carriers of the parasite, and breaking down to the disease under adverse conditions. It has been shown in Nigeria that the double inoculation against Rinderpest is such an adverse condition, and so some experimental work should be carried out amongst the Gambia cattle before carrying out double inoculation against Rinderpest on any large scale.

Should the cattle generally prove to be carriers of Trypanosomes, the mortality following inoculation would be higher than in clean cattle, but with the definite knowledge that cattle were carriers of Trypanosomes, extra precautions, *e.g.*, increase of serum dosage, could be taken to ensure that the mortality was not excessive.

At the moment Rinderpest is not present on any large scale, and owing to the big outbreaks of 1927 and 1928 having left a large number of immune cattle in their train, there is every possibility that Rinderpest will not break out in epidemic form for a year or two. I would advise, however, that if it is decided to obtain the services of a permanent Veterinary Officer, he should reach the Gambia reasonably soon in order to gain experience of local conditions and organize a staff as early as possible. This officer would be able to deal with Pleuro-pneumonia and other diseases by means of vaccination and organized control of isolation methods. He would also be able to produce a certain amount of Anti-rinderpest Serum in the Colony.

There is no doubt that, if expert help were available, the native cattle owner of the Colony would be very greatly benefited by an increase in his cattle and milk and butter, etc. The increased manurial value of more cattle is also of great importance to the farmer. There is also the possibility of cattle which at present only visit the Gambia for grazing purposes settling there permanently if Rinderpest were controlled.

On the other hand, the expense entailed by the appointment and upkeep of a Veterinary Staff has to be considered. Although the initial outlay would be considerable, I am of the opinion that in a very few years' time such a staff as suggested would prove of great economic value to the Gambia.

I wish to record my deep appreciation of the kindness and hospitality extended to me during my short visit to the Colony, and to thank the Senior Medical Officer, Dr. K. B. Allan, for supplying me with microscope, etc., and those other officers for their help in my investigation.

(Sgd.) M. V. EARNSHAW, M.R.C.V.S.,
Veterinary Officer, Nigeria.

ANNUAL RAINFALL, BATHURST, FOR THE YEARS 1890–1929, SHOWING AVERAGES FOR THE LAST FOUR DECADES.

	Inches.		Inches.
1890	60·31	1910	44·00
1891	53·41	1911	28·14
1892	51·13	1912	33·99
1893	77·89	1913	23·68
1894	55·86	1914	52·33
1895	66·86	1915	47·64
1896	51·18	1916	38·02
1897	33·61	1917	37·68
1898	48·65	1918	54·03
1899	56·59	1919	56·17
	—— 55·55 average.		—— 41·61 average.

1900	43·38	1920	34·29
1901	45·31	1921	35·12
1902	29·42	1922	45·71
1903	57·13	1923	65·38
1904	38·02	1924	56·46
1905	64·16	1925	44·09
1906	64·33	1926	35·05
1907	34·00	1927	60·58
1908	43·54	1928	56·99
1909	39·23	1929	52·30
	—— 45·85 average.		—— 48·60 average.

RAINFALL RECORDED AT THE OFFICIAL RECORDING STATIONS THROUGHOUT THE COLONY AND PROTECTORATE DURING THE YEAR 1929.

Province.	Jan. to April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
Kombo and Fogni :—										
Bathurst	—	0·08	5·66	9·68	20·63	13·12	3·09	—	0·04	52·30
Cape St. Mary ...	—	0·06	3·34	7·42	25·23	12·58	2·57	—	0·22	52·42
Sukuta	—	—	8·17	10·68	23·13	10·59	4·30	—	—	56·87
Average for Province ...	—	0·42	6·60	9·26	22·10	12·10	3·32	—	0·09	53·86
South Bank :—										
Bansang	—	0·19	8·81	8·83	20·64	8·70	1·38	—	—	48·55
McCarthy Island :—										
Georgetown	—	0·19	7·08	10·39	14·63	6·28	1·81	—	—	40·28
Upper River :—										
Mansajang	—	1·12	8·51	9·88	14·55	9·11	2·01	—	—	45·18
Wuli	—	0·84	8·28	12·68	14·65	10·96	1·11	—	—	48·52
Fattoto	—	0·57	9·07	8·39	15·08	12·18	2·61	—	—	47·90
Average for Province ...	—	0·84	8·62	10·32	14·76	10·75	1·91	—	—	47·20

NUMBER OF IMMIGRANT OR "STRANGE FARMERS" ENTERING THE GAMBIA ANNUALLY TO PLANT GROUNDNUTS.

Year.	Number.	Year.	Number.
1912	6,525	1921	22,048
1913	9,940	1922	20,566
1914	14,908	1923	17,383
1915	32,220	1924	14,188
1916	9,315	1925	14,652
1917	20,727	1926	13,553
1918	20,509	1927	17,237
1919	22,440	1928	20,640
1920	24,150	1929	18,874

TABLE SHOWING ANNUAL EXPORTS OF GROUNDNUTS FROM THE GAMBIA, 1900 TO 1929.

Year.	The Gambia.		*Saboya.		Total.	
	Tons.	Value.	Tons.	Value.	Tons.	Value.
		£		£		£
1900	35,507	204,052	298	1,789	35,805	221,841
1901	25,610	171,542	140	863	25,750	172,405
1902	31,612	193,486	—	—	31,612	193,486
1903	45,477	275,394	—	—	45,477	275,394
1904	43,436	229,287	—	—	43,436	229,287
1905	29,499	169,426	—	—	29,499	169,426
1906	36,050	278,055	—	—	36,050	278,055
1907	40,858	256,685	—	—	40,858	256,685
1908	31,964	245,084	—	—	31,964	245,084
1909	53,644	323,231	—	—	53,644	323,231
1910	58,456	387,942	—	—	58,456	387,942
1911	47,931	437,472	—	—	47,931	437,472
1912	64,169	502,069	—	—	64,169	502,069
1913	67,404	622,098	—	—	67,404	622,098
1914	66,885	650,461	—	—	66,885	650,461
1915	96,151	400,434	—	—	96,151	400,434
1916	46,366	506,098	—	—	46,366	506,098
1917	74,300	869,790	—	—	74,300	869,790
1918	56,490	800,319	—	—	56,490	800,319
1919	70,290	1,154,429	1,387	18,414	71,677	1,172,843
1920	84,037	2,322,032	1,153	76,412	85,190	2,398,444
1921	58,273	620,246	902	8,655	59,175	628,901
1922	62,978	767,197	1,822	13,692	64,800	780,889
1923	62,564	851,847	1,614	13,038	64,178	864,885
1924	58,980	841,693	1,642	20,232	60,622	861,925
1925	46,583	666,927	2,117	26,170	48,700	693,097
1926	57,344	818,884	3,728	43,694	61,072	862,578
1927	65,107	916,191	4,133	51,750	69,240	967,941
1928	74,442	1,092,790	2,330	29,463	76,772	1,122,253
1929	56,355	765,564	1,735	19,952	58,090	785,516

* Groundnuts in transit from Saboya, French Senegal through the Gambia upon which a toll of 1s. per ton is levied.

AVERAGE LOCAL PRICE PAID FOR GROUNDNUTS FOR THE LAST THIRTY YEARS.

Trade 1899–1900 ...	Wharf Towns 1s. 6d.	Shipping Towns 1s. 9d.
,, 1900–1901 ...	,, ,, 1s. 6d.	,, ,, 1s. 9d.
,, 1901–1902 ...	,, ,, 2s.	,, ,, 2s. 3d.
,, 1902–1903 ...	,, ,, 1s. 4d., 1s. 2d.	,, ,, 1s. 7d., 1s. 2d.
,, 1903–1904 ...	,, ,, 1s.	,, ,, 1s. 3d.
,, 1904–1905 ...	,, ,, 1s. 1d.	,, ,, 1s. 4d.
,, 1905–1906 ...	,, ,, 1s. 3d.	,, ,, 1s. 6d.
,, 1906–1907 ...	,, ,, 1s. 3d.	,, ,, 1s. 6d.
,, 1907–1908 ...	,, ,, 1s. 9d.	,, ,, 2s.
,, 1908–1909 ...	,, ,, 1s. 1d., 1s. 2d.	,, ,, 1s. 4d., 1s. 2d.
,, 1909–1910 ...	,, ,, 1s. 4d.	,, ,, 1s. 7d.
,, 1910–1911 ...	,, ,, 2s.	,, ,, 2s. 3d.
,, 1911–1912 ...	,, ,, 1s. 6d.	,, ,, 1s. 9d.
,, 1912–1913 ...	,, ,, 2s.	,, ,, 2s. 3d.
,, 1913–1914 ...	,, ,, 2s. 1d.	,, ,, 2s. 4d.
,, 1914–1915 ...	,, ,, 4d., 1s. 2d.	,, ,, 7d., 1s. 2d.
,, 1915–1916 ...	,, ,, 1s. 10d., 1s. 2d. ...	,, ,, 2s. 1d., 1s. 2d.
,, 1916–1917 ...	,, ,, 2s. 4d., 1s. 2d.	,, ,, 2s. 7d., 1s. 2d.
,, 1917–1918 ...	,, ,, 2s. 6d.	,, ,, 2s. 9d.
,, 1918–1919 ...	,, ,, 2s. 7d., 1s. 2d.	,, ,, 2s. 10d., 1s. 2d.
,, 1919–1920 ...	,, ,, 5s. 3d.	.. ,, 5s. 6d.
,, 1920–1921 ...	,, ,, 2s. 9d.	,, ,, 3s.
,, 1921–1922 ...	,, ,, 2s. 3d.	,, ,, 2s. 6d.
,, 1922–1923 ...	,, ,, 2s. 4d., 1s. 4d.	,, ,, 2s. 7d., 1s. 2d.
,, 1923–1924 ...	,, ,, 2s. 5d.	,, ,, 2s. 8d.
,, 1924–1925 ...	,, ,, 2s. 4½d.	,, ,, 2s. 9d.
,, 1925–1926 ...	,, ,, 2s. 2¼d.	,, ,, 2s. 3¾d.
,, 1926–1927 ...	,, ,, 2s. 6d.	,, ,, 2s. 7d.
,, 1927–1928 ...	,, ,, 2s. 9d.	,, ,, 2s. 10½d.
,, 1928–1929 ...	,, ,, 2s. 1d.	,, ,, 2s. 4½d.
,, 1929–1930 ...	,, ,, 1s. 4d.	,, ,, 1s. 7½d.

NOTE.—The above prices are only an average for each trading season. For instance, in 1919–1920 as much as 8s. per bushel of 28 lbs. was paid, this being the highest price ever paid in the Gambia.

HARRISON AND SONS, LTD., Printers, 44–47, ST. MARTIN'S LANE, W.C.2.